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The Antiseptic

A Monthly Medical Journal

Edited by

Dr. U. Rama Rau, M.L.C. & U. Krishna Rau, M.B., B.S.

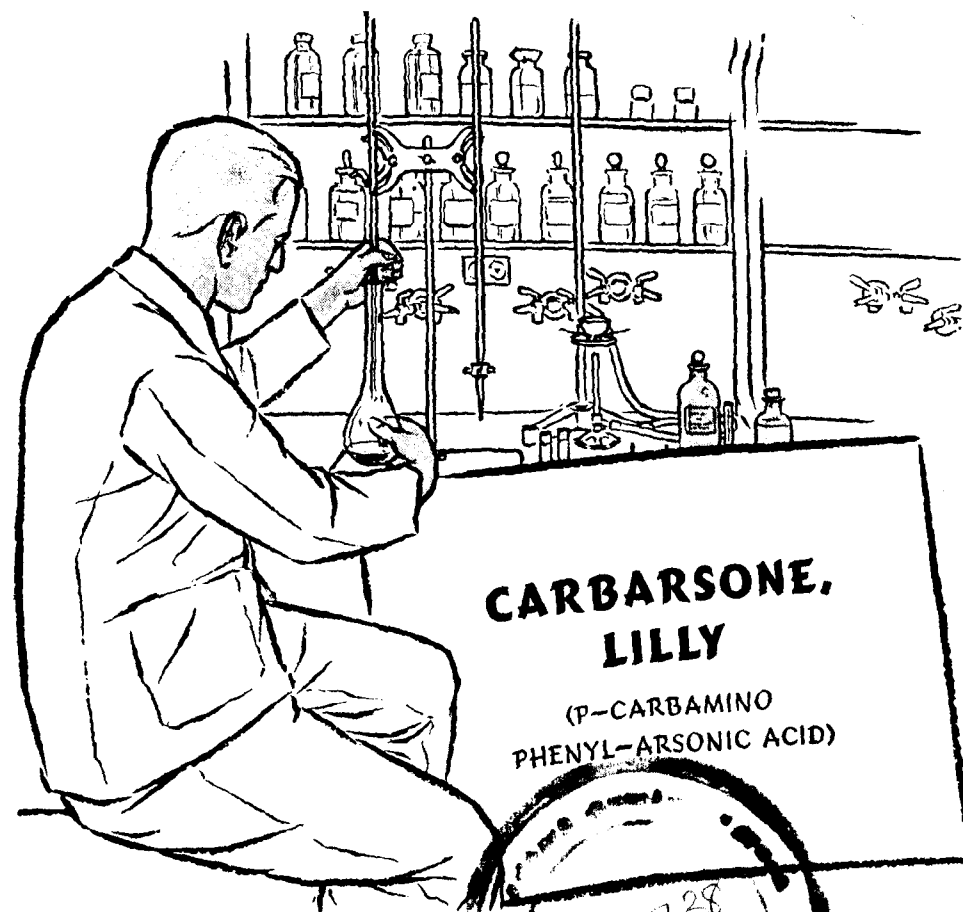
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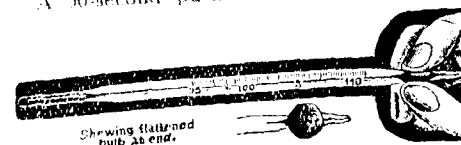
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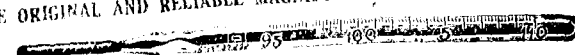
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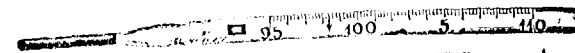
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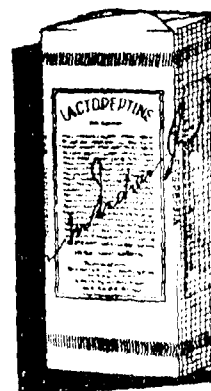
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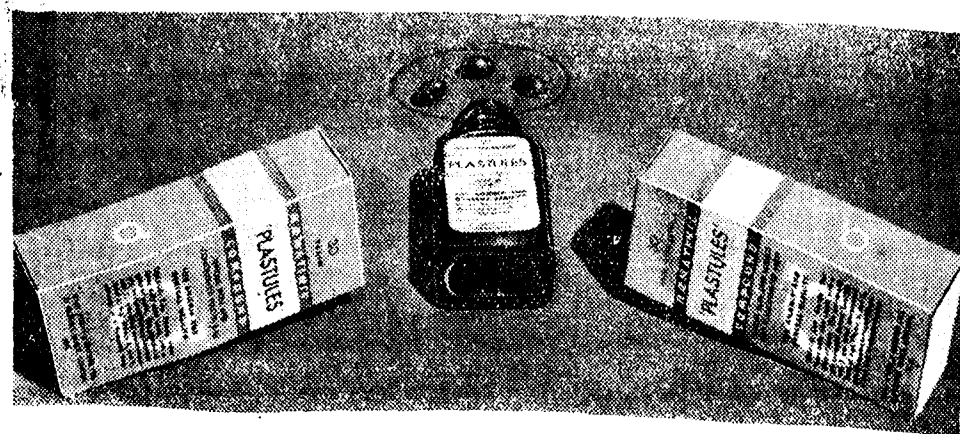
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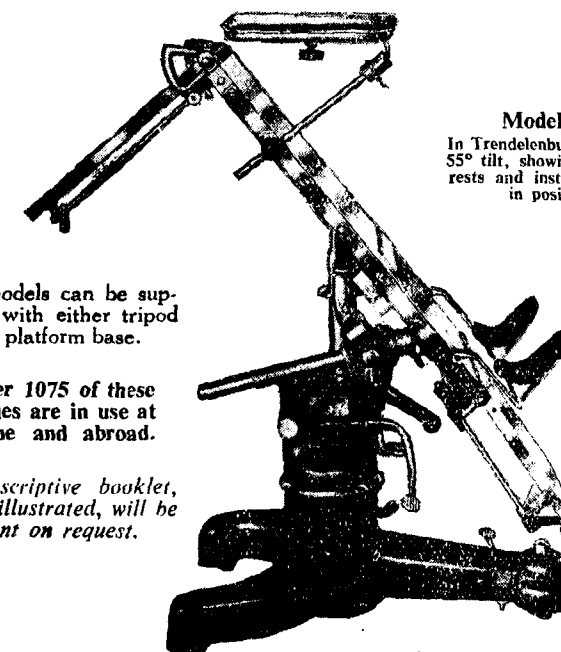
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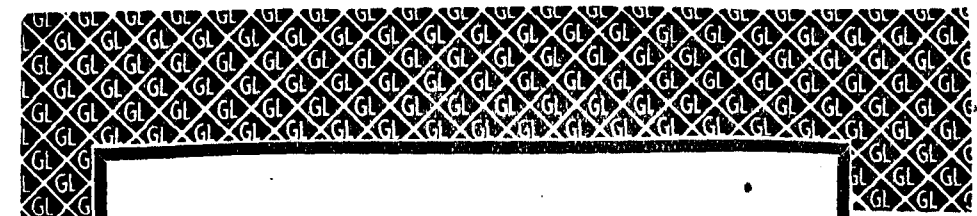
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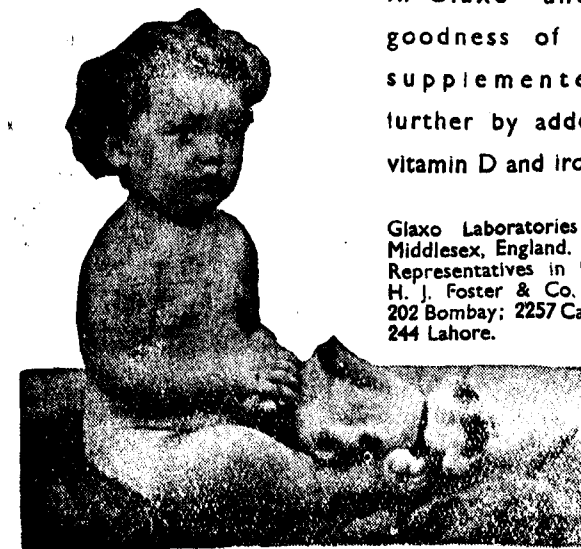
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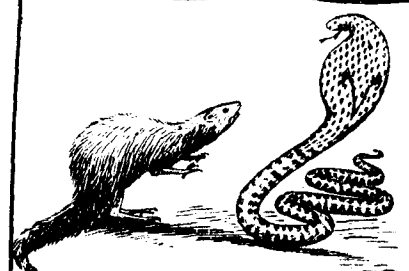
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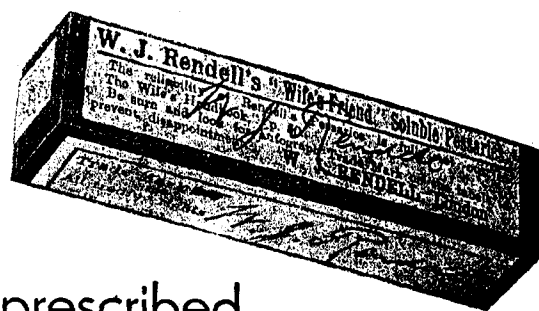
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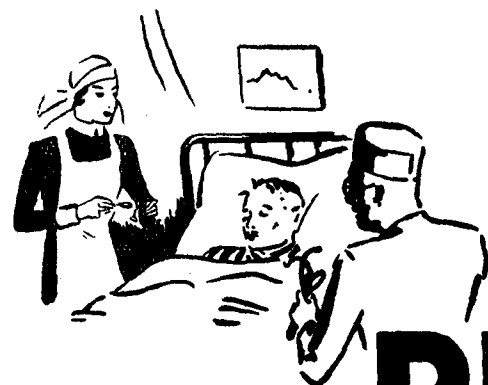
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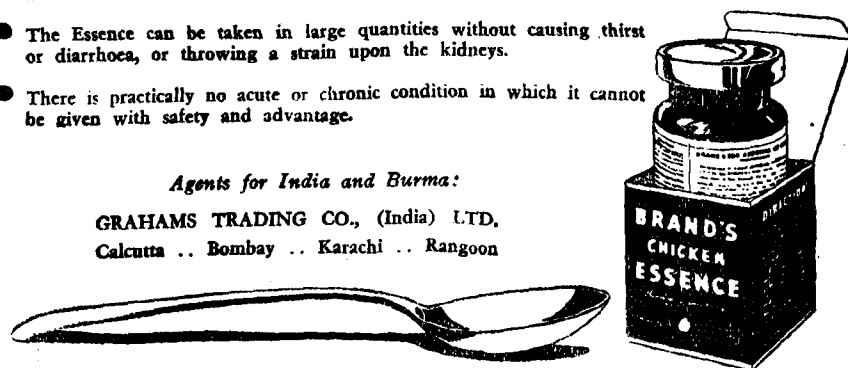
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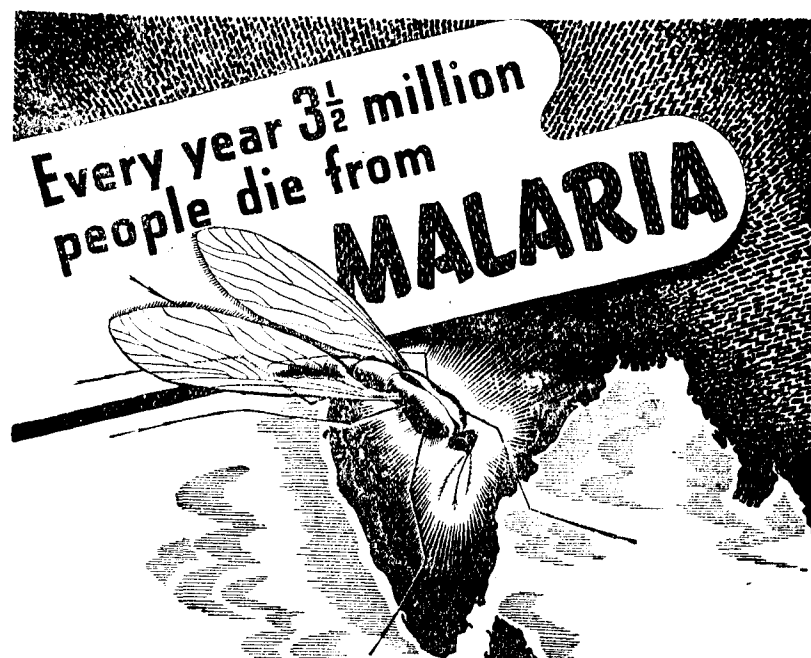
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ORIGINAL ARTICLES

Injuries of the Larynx*

BY

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INJURIES of the neck are, as a rule, seen by the general surgeon and they do not fall within the province of the laryngologist, except when the air passages are involved. There were only so few as eleven cases of laryngeal trauma admitted during a period of twelve years in the E. N. T. wards of the King George Hospital, and this discussion is confined primarily to their management and treatment. The medico-legal aspect, though important, is not dwelt upon here.

The neck is perhaps the most exposed part of the body, quite disproportionately so to its importance, containing as it does the larynx, the trachea, the great vessels and the gullet, injuries to which may prove immediately fatal or lead to very serious complications. It is, nevertheless, protected to some extent by the overhanging mandible and the projection forward of the front wall of the chest. The larynx itself is not fixed in position but suspended in soft tissues which are easily displaced. It will not thus easily lend itself to any serious injury.

The neck is very often the seat of injury, both in the suicidal and homicidal attempts. But trauma to neck is perhaps less frequent since the time when the use of the firearms has become more common in civilised countries. The bullet does not find the larynx so very often as the carotid seeking knife. The usurpation of the good old razor by the modern safety razor also removes a very handy domestic

* Specially contributed to 'The Antiseptic'.

implement from the armamentarium of the suicide and the homicide. This is all the more reason that we should feel grateful for the invention of the safety razor. Industrial, automobile and other accidents also contribute largely to injuries of the neck.

Injuries of the larynx may be classified into :—

I. Contusions.

II. Open wounds.

I. Contusions.—Contusions of the larynx may result from a blow or a crush as in throttling or strangling or from a fall with the front of the neck striking against a hard projecting object in accidental injuries. There may or may not be any external signs of trauma, but in any injury to the larynx, the first effect is œdema of the mucosa, which does not generally extend beyond the submucosa. A perforation or tearing of the mucous membrane may produce surgical emphysema with septic infection of the cellular tissue planes of the neck later on. Injury to the vessels may result in extensive extravasation of blood under the skin or the mucosa and this may produce pressure upon the larynx or the œsophagus. In more severe injuries, the larynx or the trachea may be completely crushed or torn ending rapidly in death by suffocation. Fractures of the hyoid bone and the laryngeal cartilages rarely occur. There is local swelling, tenderness and pain which is increased in moving the neck or swallowing. There may also be wheezing and difficulty in breathing, depending upon the presence of œdema or a submucosal hæmorrhage, and cough and blood stained expectoration when there is laceration of the mucosa. Laryngeal dyspnoea is characterised by inspiratory indrawing at the suprasternal notch and in children at the epigastrium also.

In addition to external physical and X-ray examination, laryngoscopy, direct and indirect, will help the diagnosis.

Treatment.—"The chief danger lies in the interference with respiration and this is met by an early performance of tracheotomy. It should certainly be done if there is any trace of subcutaneous emphysema."

There were two cases in this series in which there was a development of surgical emphysema. It is interesting to note that the necessity for a tracheotomy did not force itself upon in either of them at any stage. The first case made a complete recovery and the patient was discharged in a fortnight's time after admission. The second patient was under observation in the hospital for three weeks and there was no dyspnoea at any time. He was running a slight temperature for three days preceding his discharge. His general condition was otherwise good.

1st Case:—K. S.—a male, Hindu, aged 12 years, had a fall from a tree from a height of 10 feet. His neck struck against a stone. Within half an hour after the fall, surgical emphysema was noticed. There was no bleeding from the mouth; no difficulty in breathing,

and no change in voice. X-ray examination revealed no evidence of fracture. Emphysema gradually disappeared. There must have occurred a small laceration of the mucosa in this case which could not be detected on examination.

2nd Case:—B. S.—a male, Hindu, aged 28 years, had an accidental fall from a height of 10 feet while pursuing a jackal on the hills. He received two superficial wounds; one on the chin and the other on the neck. He was admitted two days after the accident with surgical emphysema, difficulty in swallowing and hoarseness of voice. Indirect laryngoscopy showed intensive congestion of laryngeal mucosa. There was deficiency in adduction of the right vocal cord. A fracture of the thyroid cartilage was suspected but X-ray evidence was negative.

II. Wounds of the Larynx.—They are commonly called "Cut-throat" wounds of the neck. In a large percentage of cases, which reach surgical aid, the wound does not fortunately involve any vital structures. The great vessels of the neck are protected by the sternomastoid muscle and the prominent larynx which bears the brunt.

The principal sites of these wounds are :—

1. Above the hyoid bone	... 14%
2. Through the thyreo-hyoid membrane	... 35%
3. Through the thyroid cartilage	... 32%
4. Wounds about the cricoid cartilage	... 17%
5. Division of the trachea	... 7%

There were nine cases of this class of injuries. Six cases³ in this series (67%) were of injury through the thyreo-hyoid space. Two (22%) were through the crico-thyroid space. Eight were males while there was only one female. Seven were suicidal and two gave history of accident and all were adults aged between twenty and thirty five years of age, excepting the female who was only eighteen years old. Her wound was suicidal.

The wound presents in all cases a gaping appearance and its edges are turned in, on account of the contraction of the platysma. The bleeding is rarely alarming. There is pain and difficulty in swallowing. Food and saliva escape through the wound when the thyreo-hyoid membrane is divided. There is some difficulty in breathing. Coughing is persistent. The voice is reduced to a whisper.

The prognosis should be very guarded depending upon the general condition of the patient both physical and mental. Shock, loss of blood, asphyxia from blood entering the air passages and oedema of the glottis, septic cellulitis, septic pneumonia are all very serious complications, which may prove fatal. In no case of this series was there any one of these complications and all were discharged cured.

Treatment.—It is based on the same general surgical principles which apply to wounds elsewhere on the body. The main points

applicable to the treatment of these wounds are summarised as follows :—

1. Stopping the bleeding is the first indication. Injury to the great vessels as already stated is comparatively rare and when it occurs surgical aid may be beyond the reach of the patient to save him. In cases where there is still some bleeding when first seen, it is arrested by digital compression. The bleeding vessels are sought for and ligated, the wound enlarged if necessary.

2. Dealing with the wounded air passage: when the air passage has been opened, a laryngotomy or a tracheotomy tube is to be introduced to avoid any risk of œdema of the glottis and then the rest of the wound repaired.

3. Repair of the other wounded structures :—If the food and air passages are unhurt, any muscles that are torn must be sutured. When the epiglottis is damaged in wounds opening into the pharynx it should be repaired with fine catgut sutures. The mucosa of the pharynx is then united. The muscles are approximated and the wound closed with drainage. In all cases the superficial part of the wound should be drained.

4. When the pharynx has been opened the use of the nasal tube for feeding should be insisted upon.

Nasal feeding affords rest to the larynx as :

- (i) there is never any effort made to swallow and the muscles concerned with deglutition are not called into action during the feeding. Consequently the edges of the wound are left undisturbed ;
- (ii) it prevents food material entering the larynx and thus eliminates the violent efforts at coughing. The contamination of the wound by the food material is also prevented;
- (iii) the salivary and oro-pharyngeal mucous glands having been deprived of the reflex stimulus of the food coming into contact with the mouth or the pharynx secrete far less than otherwise and the effort at swallowing their secretions is reduced to a minimum.

5. In applying the bandage, the head should be flexed on the chest to take off all tension on the stitches.

6. No matter what the character of the injury is, the most important thing is to keep a close watch for signs of laryngeal obstruction and a prompt tracheotomy should be done.

Now a description of the wounds in the nine cases No. 3 to 11 of cut-throat wounds in this series with the treatment adopted is given in the following table:—

Number.	Name.	Age.	Sex.	Date of Admission.	Date of Discharge.	Duration of the wound before admission.	Description of the Wound.	Treatment adopted.	Remarks.
3	M. S.	25	M	16-4-1927	26-4-1927	10 days	1. A transverse incised wound 4" long exposing the crico-thyroid membrane which was punctured. 2. A second wound 2" long more superficial and above the first on the left side of the neck.	The wounds were superficial and they were repaired and dressed.	A laryngotomy tube is advised to be inserted when there is a wound of the crico-thyroid membrane. But it was only a small punctured wound and the wounds were superficial. No tube was therefore inserted. The patient had to be transferred to the mental hospital on account of his mental condition before the wounds completely healed.
4	D. V.	30	M	27-3-1929	25-5-1929	2 months & 2 days	A horizontal gaping wound 5½" long and cutting through the thyroid cartilages just above the vocal cords, leaving a diamond shaped opening bounded by the vocal cords below. They are seen to move freely with inspiration and attempts at phonation.	Wound was very septic. A low tracheotomy was done on 28-3-29. Wound was repaired on 13-4-29.	Tracheotomy tube was removed. The wound completely healed. Vocal cords showed adduction still limited and voice still was hoarse when the patient was discharged.
5	K. N.	25	M	1-7-1931	20-12-1931	2 months.	A sinus over the thyroid cartilage discharging pus and surrounded by protruding unhealthy granulations. The swelling around extending from the upper border of the thyroid cartilage to the middle of the cricoid cartilage is hard and tender. No fluctuation could be elicited.	The sinus was opened on 6-7-31 and the pus let out after doing a tracheotomy.	The patient was admitted two months after the accident. He had been treated in a mofussil hospital and transferred here. General condition very good. Voice hoarse. There was a little difficulty in swallowing. He got attacks of dyspnoea when lying down and during sleep. The patient was discharged with the sinus completely healed but wearing the tracheotomy tube; There was stenosis of the larynx and the tracheotomy tube had to be retained.
6	B. S.	20	M	11-4-1931	2-5-1931.	A few hours	A transverse cut across the neck at the level of the upper border of the thyroid cartilage exposing the pharynx.	Tracheotomy was done & the wound was repaired and closed with drainage on 11-4-31.	20-4. Tracheotomy tube was removed. Wound completely healed. Patient breathing well through the natural air passages. Had B. T. malaria for two days otherwise convalescence uneventful.

Number	Name	Age	Sex	Date of Admission	Date of Discharge	Duration of the wound before admission	Description of the Wound	Treatment adopted.	Remarks.
7	A. D.	18 F		23-9-1932	7-11-1932	14 hours	An incised wound running obliquely across the neck, just above the thyroid cartilage. The pharynx is exposed between the thyroid cartilage and the hyoid bone.	24-9. Tracheotomy was done and the wound was closed by two sets of sutures with drainage. On 7-11-32.	1-10. Sutures removed. 15-10. Wound completely healed up. Had some mental symptoms from which she recovered. The tracheotomy tube was removed. The patient was discharged on 7-11-32.
8	M. S.	25 M		5-6-1932	1-7-1932	14 hours	A transverse wound between the hyoid bone and the thyroid cartilage. Pharynx opened. Upper border of the thyroid cartilage exposed. Vocal cords well seen.	Tracheotomy was done and the wound was closed with drainage, on 5-6-32.	Had a slight rise of temperature for three days. 18-6. Tracheotomy tube removed. 26-6. Wound sealed with Tr. Benzoin. 1-7. Patient discharged.
9	B. K.	30 M		18-7-1934	3-10-1934	4 days	A deep transverse cut through the thyrohyoid space. Pharynx opened.	19-7. Wound in the neck repaired. 23-7. All the sutures in the neck gave way and wound was repaired. 19-8. Wound was repaired a second time. No tracheotomy was done.	He had another cut on the middle and ring fingers of the left hand. Flexor tendons of the ring finger were cut. It was repaired by Dr. M. G. Kini, F.R.C.S. Both wounds healed and the patient was discharged on 3-10-34.
10	D. K.	34 M		21-10-1936	18-12-1936	3 days	A transverse wound 4" long cutting through the thyrohyoid membrane and epiglottis. Posterior wall of the pharynx exposed.	5-11. Wound was repaired. No tracheotomy was done.	The patient was running an intermittent temperature for a week from the date of admission and till the temperature came to normal, the repair of the wound was postponed. There was again a rise of temperature after the wound was repaired which came down to normal in three days. The wound healed and the patient was discharged on 18-12-36.
11	P. A.	27 M		5-12-1939	1-2-1940	A few hours	An incised wound 6" long transverse cutting through the thyrohyoid membrane.	11-12. Wound was repaired under intratracheal anaesthesia. Sutures did not take. 28-12. A tracheotomy was done and the wound was repaired.	The patient was discharged the wound having healed and tracheotomy opening closed on 1-2-1940. Indirect laryngoscopy—larynx normal excepting for a slight tilting to the left of the epiglottis.

Discussion.—In none of these cases was there any severe bleeding worth recording.

In case No. 3, where there was a wound of the crico-thyroid membrane, the insertion of the laryngotomy tube was indicated, but as it was only a small punctured wound, it was not done.

In case No. 4, where the thyroid cartilage was cut through, a tracheotomy was done as indicated.

In case No. 5, where the patient was admitted two months after the injury with a sinus over the thyroid cartilage consequent upon the development of perichondritis, and threatening stenosis, a tracheotomy was done. The wound healed but resulted in complete stenosis and the permanent wearing of a tracheotomy tube. When tracheotomy is done and there is a probability of chronic laryngeal stenosis, a larger rubber core mould should be drawn down the larynx. Had this been done in this case, a complete stenosis would have been prevented.

In the last six cases, the wound was inflicted through the thyrohyoid membrane. In cases No. 6, 7 and 8 a tracheotomy was done and the wound was repaired immediately after admission. In cases No. 9, 10 and 11, no tracheotomy was done but subsequent progress was never threatened by an oedema of the larynx. In the last case a tracheotomy was only done preliminary to repairing the wound a second time, with the object of hastening the healing of the wound but not that there is any danger of a possible obstruction to breathing.

In cases No. 6, 7 and 8, where the patient was admitted within a few hours after injury and a tracheotomy was done, and the wound repaired soon after admission, the wound healed almost by first intention. Shortly after this the tracheotomy tube was also removed and the opening was allowed to close up.

In case No. 9 where no tracheotomy was done, the sutures first put did not take and the wound had to be repaired a second time. In case No. 11, also, the sutures gave way in the first instance. A tracheotomy was done, the second time, and the wound was repaired, in order to run no more risk of the sutures breaking down and to shorten the already prolonged convalescence.

No. 10 is the only case where the stitches did not give way and the wound healed without a tracheotomy having been done and without having been forced to resuturing the wound a second time.

The superficial part of the wound was always drained by the putting of a cigarette or rubber tissue drain at either end of the wound. Feeding was done through the nasal tube till the edges of the wound completely united.

The one point that strikes one as of great importance in the management of these cases, is the performance of a tracheotomy irrespective of the presence or not of respiratory distress at the time

or of its possible development later on. It diverts the passage of air and all secretions of the respiratory tract below, away from the injured larynx. There is always a certain mild catarrhal inflammation of the tracheal and the bronchial mucosa in these cases and the increased output of its secretions finds its way out through the tracheotomy tube instead of passing through the larynx and contaminating the wound. The tracheotomy opening thus most effectively serves the purposes of a channel for the drainage of the injured and inflamed respiratory tract.

The first essential principle of treatment of an inflamed or injured part is the provision for rest to it and this is afforded in the case of laryngeal injuries most effectively by putting a tracheotomy tube and resorting to nasal feeding till the wound heals up. It is also important that the head should be kept flexed on the chest to take off all tension on the stitches as already pointed out above. The importance of the time factor before the repair of the wound is undertaken is also borne out by the comparatively prompt healing and shorter convalescence of the cases No. 6, 7 and 8., where the repair was undertaken in less than twenty four hours after the injury. The more the time elapses, the greater are the chances of infection of the wound, militating against a primary union of the edges of the wound. It is noteworthy, however, that even in the cases where there was a long delay before surgical aid was made available, they were singularly free from serious complications of any kind.

Summary.—Eleven cases of injuries to the larynx have been reviewed, including two admitted with a complication of surgical emphysema. The value of invariably doing a tracheotomy in the treatment of these injuries, apart from its necessity if any, from the presence at the time or possible development later, of respiratory obstruction, has been stressed. The importance of nasal feeding as an important factor in affording rest to the injured part has also been emphasized.

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Ovario-Pituitary Endocrine Mechanism*

BY

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JUST as the brain and the vital centres are installed in a secured position within the cranial cavity, so is the pituitary body—the master gland of endocrine functions. With the increasing advance made in our knowledge of endocrine functions, many and varied are the hormones attributed to pituitary body.

Methods of Investigation.—Researches have been directed towards the study of these *chemical messengers* shot out into the blood stream by endocrine glands—firstly by animal experiments, secondly by post-mortem findings in persons who showed certain clinical symptoms during their life time, thirdly by clinical observations recorded from patients who lost their glands at the hands of a surgeon or a radiologist and lastly by observing the effects of replacement or stimulation by hormonal therapy given to those who suffered from certain clinical symptoms. Recent advances have been directed towards the study of the chemistry of these hormones and Bio-chemists have, in recent years, actually succeeded in preparing at least some of the hormones synthetically in their laboratories so that now larger quantities of them are available for therapeutic purposes.

The Attributes of the Pituitary Body.—Pituitary body mainly consists of two parts. The posterior or the Pars Nervosa derived from the base of the brain and the anterior or the Pars Glandulosa derived from the Ratke's pouch which originally started as a diverticulum of the ectoderm lining the buccal cavity. Following are in brief the various attributes assigned to each of these lobes by different research workers.

From the Anterior Lobe.—

1. Gonadotropic hormones : (Prolan A, Prolan B.)
2. Growth promoting hormones.
3. Prolactin and Lactin (Physiolactin by Glaxo lab.)
4. Menstruation and labour centres? Hormones?
5. Thyrotropic hormone, destruction of which causes atrophy of thyroid gland.
6. Præphyson—a metabolic factor.

From the Posterior Lobe.—

1. Vasopressin or Pitresin.
2. Oxytoxin or Pitocin.

* Specially contributed to “The Antiseptic”.

3. Anti-diuretic factor secreted by certain cells known as pituicytes.

The Importance of Growth Promoting Hormone.—The most important among the functions that the anterior pituitary is credited with are the promotion of growth and the sexual activity of an individual which ultimately results in the growth of the cells of the same individual but away from his own person—his offsprings.

Histologically, the anterior pituitary body is found to contain certain acidophilic cells which have affinity for acid stains and it is these cells that promote the growth, of the individual. If these cells are affected by some disease or growth there results marked disturbances of skeletal development. Their hyperfunction occurring in childhood results in pituitary gigantism, whereas similar affections give rise to acromegaly in adults. Pituitary dwarfism is the outcome of hypofunction of these cells whereas 'Dystrophia adiposo genitalia' results from some disturbances in the hormonal chain of activity. Here, there is an over-growth of fatty tissue all over the body with atrophy of the genitals.

The Gonadotropic Hormones.—The particular cells of the anterior pituitary gland which are responsible for sexual activity are found to be basophilic and take up alkaline stains. Nature has provided the necessary nice adjustment in the relative amounts of growth hormone and sex hormones secreted by the anterior pituitary body. That the growth of animals is accomplished before the attainment of sexual maturity may possibly be due to early predominance of the growth hormone.

Animal Experiment on Sex Hormone.—EVANS and LONG have showed that alkaline or Glycerine extracts of the anterior pituitary body, injected daily into an animal, causes expression of an œstrus cycle and its ovaries are found to contain masses of luteal tissue with entire absence of follicles. Conversely, if fragments of anterior pituitary gland are grafted beneath the skin, the ovaries become very highly follicular due to rapid maturation of unripe follicles together with absence of corpora lutea.

Prolan A & B of Anterior Pituitary Body.—These investigations have led to the conclusion that the ovarian activity depends upon two distinct sex hormones of the anterior hypophysis. The œstrus phase is presumably provoked by a hormone which is termed Prolan A by ZONDEK and Rho I by WIESNER. The potential pregnancy phase, characterised by progestational proliferation of the endometrium is said to be due to another sex hormone which is termed Prolan B by ZONDEK and Rho II by WIESNER. Other workers are inclined to believe that there is only one gonadotropic hormone secreted by the pituitary body and the different reactions in the ovary depend upon its quantitative effect and the reaction phase of the ovary itself. The results are often not constant in pre-pubertal animals whose ovaries have not developed to responsive stage.

The consensus of opinion at present, however, is that the ripening of the Graafian follicle in the first half of the menstrual cycle is controlled by Prolan A and the development of the corpus luteum in the pre-menstruation period and its continuation during pregnancy, should the fertilisation and implantation of the ovum take place, is controlled by Prolan B, both of which are secreted by the basophilic cells of the anterior pituitary lobe.

Fertilised Ovum and its Relation with Ovario-Pituitary Mechanism.—It is possible that the developing ovum in the uterus sends out certain stimuli, mostly of the nature of hormones, which stimulate the anterior pituitary body to maintain the secretion of Prolan B, which in turn keeps up the activity of the corpus luteum of pregnancy. This Prolan or anterior pituitary-like substance is found in abundance in the urine of pregnant women and forms the basis of A-Z pregnancy test. FRIEDMAN has modified the same test by using mature rabbits instead of mice.

Twenty-five c.c. of urine in the course of 48 hours are injected into the ear vein of a female mature rabbit that has been isolated for at least a month. Laparotomy done under ether anæsthesia on such an animal will show certain changes in the ovaries, if the urine injected had been obtained from a pregnant woman. These changes are:—

- (1) Formation of cystic follicles.
- (2) Hæmorrhages in some of them.
- (3) Development of atretic corpora lutea.

The last two changes are important in diagnosis of pregnancy. Recently, the same test has been performed on frogs and the results have been obtained within as short a period as six hours. One c.c. of concentrated urine is injected in the subcutaneous lymph space which stimulates its ovaries to throw out large number of eggs in a very short time.

These biological tests are strongly positive in cases of vesicular mole and remain so as long as 8 weeks after the expulsion of the mole unless chorion epithelioma has developed in which case it persists as long as the growth or its secondaries are progressing. Associated with these, one often finds compound theca lutein cysts in both the ovaries. These as well as the urine reaction disappear on expulsion of the mole or on the removal or on irradiation of the malignant trophoblastic growth.

Urinary Prolan and Anterior Pituitary Hormone.—The significance of these biological tests one cannot fail to appreciate, but one is not sure whether the test is due to gonadotropic hormone of the anterior pituitary or some other hormone akin to it. It has been noticed that hypophysectomised animals do not show ovarian reaction on injection of the urine obtained from pregnant women. This conclusively points to the fact that the urine does not contain the pituitary substance but some other hormone secreted by the chorionic

cells which in turn stimulate the anterior pituitary body to influence the ovaries.

Pituitary Activity at Menopause.—At menopause, the ovaries atrophy but the blood is found to contain excess of anterior pituitary hormone as if to flog the senile and exhausted ovaries. It is possible that this excess of hormone in the blood at the menopause results from its non-utilisation by the withering ovaries or is it that the inhibitory influence of the œstrin on the pituitary is lost at menopause? Uterine hæmorrhages, due to functional causes and occurring at this period of life, cannot be influenced by the injections of pituitary hormones for obvious reasons.

Functional Uterine Hæmorrhages and Ovario-Pituitary Mechanism.—The problem is quite different, however, in hæmorrhages occurring in Metropathia Hæmorrhagica. This condition should properly be named as ovario pathia metro-hæmorrhagica, since uterine bleeding is only symptomatic of the changes going on in the ovaries. In this condition, the ovaries develop a number of Graafian follicles, which neither ovulate nor develop into corpora lutea. Long periods of amenorrhœa are interrupted by periods of profuse and prolonged bleeding when distended follicular cysts can no longer receive adequate blood supply to continue the secretion of œstrin. Hence, the beneficial results produced in these cases by injections of luteanising hormones of the anterior pituitary or Progesterin itself are but to be expected. Failure of pituitary injections in some of these cases is probably due to inclusion of Prolan A factor which cannot effect luteanisation of the follicles.

The granulosa cell tumours of the ovary which have aroused great interest among the pathologists and the bio-chemists are probably the outcome of abnormal pituitary activity. Here also, blood œstrin level is abnormally high and periods of uterine hæmorrhage are interrupted by long periods of amenorrhœa.

The Dangers of Excessive Œstrin Therapy.—The success in the synthetic production of œstrin has led to its use in large quantities for therapeutic purposes but a note of warning may be given here for the over-enthusiasts. Excess of œstrin therapy stimulates the overgrowth of the chromophobe cells of the pituitary body and inhibits the production of gonadotropic hormones by the basophil cells. Œstrin therapy given to cases of amenorrhœa should neither be continuous nor prolonged since the inhibition of the gonadotropic hormone would be a distinct disadvantage in these types of cases. I am sure, that apart from animal experiments, nobody would be using œstrin in such gigantic amounts as to invoke its carcinogenic properties in human beings.

Pregnancy, Labour and Ovario-Pituitary Mechanism.—The pituitary body enlarges during pregnancy and certain large cells known as pregnancy cells make their appearance. Perhaps their atrophy at term is responsible for the death of the corpus-luteum and then in the

active presence of œstrin (which had been so long opposed by progesterin) the post pituitary hormone acts on the uterine musculature. Throughout the pregnancy, the œstrin is accumulated in the maternal organism but is kept in check by progesterin.

Ovario-Pituitary Mechanism before Puberty.—The gonadotropic hormone of the anterior pituitary is being secreted from the birth as shown by the activity of implants obtained from immature animals and grafted on to the mature ones, the latter developing the typical changes in the ovaries in response to the grafts. This shows that it is the ovaries that are awaiting the full development which takes place only at puberty from which time ovulation or liberation of ova, begin to occur. Until this time, the primordial follicles do keep on developing into Graafian follicles and these do secrete œstrin so essential for the general well-being and gradual sexual development and the growth of genital tract of the individual although ovulation actually does not take place.

Pituitary Body is the Motor of the Sex Functions.—All these changes take place under the influence of anterior pituitary body which is shown to be active even when obtained from pre-pubertal animals and hence is rightly termed as the "motor of the sex functions". Nobody, however, can deny the influence exerted by thyroid, thymus pineal and adrenal bodies on the ovaries. Functional disturbances of the ovaries and uterine hæmorrhages are often to be looked upon as clinical manifestations of an abnormal state of the "sex complex"—a term introduced by BLAIR BELL to signify co-ordination of the ductless gland system upon which normal development and sexual function of the healthy female depend.

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Cholera—Its Ætiology, Propagation and Prophylaxis *

BY

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Preliminary Remarks.—Of all the preventable diseases, which are decimating the population of Bengal, probably cholera stands second only to malaria; but people generally dread this fell disease more than malaria and other maladies, owing to its rapid and fatal termination in a very large proportion of cases as well as on account of the intense and agonising suffering of the patient during the course of the disease.

Ignorance of sanitary laws is undoubtedly responsible for the rapid spread of the disease among the people in a locality. It is also a matter of great regret that even educated and enlightened men cannot always be wholly absolved from all the blame for it.

Careless disposal of the infective excreta of cholera patients, namely, the vomits and stool—especially the latter—without thorough disinfection and washing of the infected clothings and linens in tanks, reservoirs, streams, rivers etc., the water of which is used for drinking purpose are, among many other sources, the main factors responsible for many an outbreak of the disease either in an endemic or epidemic form.

Ignorant of the real cause, the people during an outbreak, even in this enlightened age, in order to cut short or avert it, offer puja (worship) to the gods and goddesses to whose wrath such visitations are ordinarily attributed, or sometimes call in the aid of Fakirs (religious mendicants) and Ojhas (exorcists) to drive out the evil spirit which, they believe, is responsible for the origin and diffusion of the disease. Unfortunately, this belief is not confined to the illiterate and uneducated villagers alone, but it is shared even by some of the so-called educated and semi-educated persons.

It is, therefore, the duty of all medical men—especially those who have got to live and practise in the rural areas—to educate the people in ordinary laws of sanitation and to make them understand the real cause as well as the mode of propagation of the disease by dispelling all wrong ideas and false impressions from their minds in respect thereof.

It is also essential to convince them of the need for adopting proper, adequate, and suitable preventive measures, at the very outset, to put a stop to a general outbreak among the people in a locality and thereby to save the lives of many persons who might otherwise have fallen victims to it.

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Cholera (Asiatica) is a specific infectious disease caused by the invasion and growth in the alimentary canal, of the specific pathogenic micro-organisms called comma bacilli and is characterized clinically by vomiting, purging, cramps, rapid collapse etc.

The disease is appropriately known in Bengal by the name *Ola-Utha* (*Ola*=to descend and *Utha*=to ascend) i.e. "descent" and "ascent" meaning thereby "purging" and "vomiting" which are apparently the most characteristic signs of the disease in all cases except Cholera Sicca.

Endemicity.—Though no part or province of India is absolutely free, at least from occasional outbreaks of the disease, Bengal may unquestionably be regarded as the home of cholera. The disease is always found to be endemic in this as well as in some other provinces of India such as Madras, United Provinces and to some extent Bombay and Burma. It breaks out sometimes in epidemic form spreading rapidly all over the country. But sporadic cases are reported from various districts of Bengal throughout the year.

Almost all the epidemics and pandemics described by various investigators, from the earliest times down to the most recent years, could directly or indirectly be traced to have their origin in Bengal, where the disease seems to have taken a permanent abode; for, climatic condition and other circumstances such as low-lying alluvial soil and high sub-soil water level combine to provide an extremely favourable condition for the growth, multiplication and prolonged existence of the causative micro-organisms of the disease in the soil of this province all the year round.

Besides India, cholera seems to be endemic in some other places such as East Indies, Southern China and Phillipine Islands.

Persia and Southern Russia, though occasionally visited by cholera in an epidemic form, do not probably fall under the endemic area as the disease is sometimes found to be absent from these places for several years in succession.

Epidemiology.—Once it breaks out in any one of the endemic zones mentioned above, the disease rarely remains confined within a limited area, but usually assumes an epidemic form owing to its rapid dissemination among the people in the neighbouring places, spreading as a rule, along the lines of human intercourse, especially along the trade and shipping lines; the rate of diffusion depends entirely on the nature and rapidity of transport.

Before the introduction of railways, steamship and other swifter conveyances, when the ordinary transports or communications were much slower and used to be done on foot, cart, country-boats etc., the disease used to take a longer time to spread from place to place or from one country to another, during an epidemic or pandemic as the case might be. Owing to the rapid means of communication by railways, steamship, motor-boats or cars, it is now found to be disseminated much more quickly than before. The advent of aeroplane

as an ordinary means of transport, especially for passengers, is likely to become a great menace to the public safety owing to the possibility of rapid diffusion of the disease all over the world, unless strict and special precautionary measures are adopted to prevent the transmission of it by "carriers" or even by infected persons during the period of incubation. Hence sporadic cases or even small outbreaks of the disease may, in future, be unexpectedly met with in any part of the world which may be in communication with an endemic area of cholera.

Mode of Dissemination.—The principal modes of dissemination of cholera, besides the ordinary human intercourse, are stated below:

- (1) Pilgrimage.
- (2) Trade.
- (3) Expedition.

1. *Pilgrimage*:—Sudden assemblage in most insanitary and trying conditions, of huge crowds of people from various parts of the country in a town or place, too small to accommodate them, (as for example at Puri during the 'Car Festival') leads very often to a general outbreak of cholera among the pilgrims who, on dispersion, carry infection to the wayside places on their return journey.

2. *Trade*:—From the very early times, the disease was found to propagate along the routes both by land and sea through which the trade and commerce as well as passenger traffic used to be carried on between India and other countries. The quicker the means of transport, the more rapid used to be the diffusion of the disease in an epidemic form.

3. *Expedition*:—During war, expeditionary armies or forces may be transported or made to march from an endemic area to the seat of the war. These forces carrying infection with them may, during their long journey through various places, distribute the disease along the line of their transport or march.

Seasonal Variation.—The most virulent epidemics are usually found to occur in the summer as well as in autumn months though a more or less temporary lull usually occurs during the heavy monsoon in rainy season, when the country is inundated or flooded with water and also when the temperature is very low in the winter.

Antiquity.—The disease was probably not unknown in ancient India as mentions are found to have been made in or about 400 B. C. by such eminent Hindu physicians as CHARAKA and SUSRUTA in the *Ayurveda*—the Hindu systems of medicine, of a disease from the signs and symptoms of which it can easily be inferred that the malady is no other than cholera. References to the disease are also found in the writings of various Europeans who visited India in ancient times for the purpose of trade or conquest.

History.—A full and detailed account of the numerous outbreaks of cholera in India from the earliest times down to the year 1917 A.D.

is available in the "Annals of Cholera from the earliest periods to the year 1917" by JOHN MACPHERSON. As the descriptions of these are only of academic interest, it will serve no useful purpose to discuss them here. Some of these outbreaks no doubt occurred in epidemic forms and played havoc among the people of this as well as neighbouring countries.

The first authentic and graphic account of the disease was, however, found in the description of the epidemic of cholera, which originating at Jessore (Bengal) in 1817, spread over almost the whole of India and beyond its boundaries, to other neighbouring countries such as Persia, Syria and South Russia within a period of about 6 years. This epidemic lasted till 1823 and assumed a most formidable and alarming character owing to the severity of the attack and a very high percentage of deaths among those who contracted the disease.

Since the epidemic of 1817 till the epoch-making discovery of the comma bacillus as the causative micro-organism of the disease by KOCH in 1883, various investigators and observers, ignorant of the real cause, sources of infection and modes of propagation, propounded various contradictory theories, or better still speculations, at different times to explain the occurrence and spread of the malady in sporadic or epidemic forms.

In 1820, DR. JAMES JAMESON, Secretary of the Medical Board, in his work attributed the disease to an unknown virus, affecting the stomach and small intestines, producing vomiting and purging followed by shock. Irregular seasons and improper food were not regarded as exciting causes, though moist east wind and alluvial soil, according to him, might have had something to do with the disease.

Theories.—It is of no use to enumerate or describe in detail the various views and theories promulgated by different investigators and observers during this period. Suffice it to say, that while some observers held the disease to be a contagious one, the others emphatically denied it to be so. While one considered it to be due to a poison generating from the soil under peculiar circumstances, another attributed the disease to the disturbed nervous action resulting from deficient aeration of blood owing to insufficient electric fluid in the atmosphere during an unsettled weather.

The air-borne theory was, however, held by some observers in Europe about this time. Climatic variations and exposure to chill were regarded as important exciting causes. Quarantine or segregation was regarded useless and unnecessary as a preventive measure owing to the firm attitude taken and almost dogmatic assertion made from time to time by many investigators and observers, against the infectiousness of the disease. They strongly believed and persistently held that the disease could not, by any means, be communicated to a healthy person by contact with a diseased one.

Though contradicted later on by DRs. BAILY and GULL, in a report published in 1856 and by many others subsequently, DRs. SNOW

and BUDD, for the first time in 1849, attributed the disease to a specific poison in the vomits and stools of cholera patients, which when ingested by susceptible persons, produced the signs and symptoms of the disease. Drinking of water from wells and rivers contaminated by this specific poison owing to defective drainage as well as ingestion of infected foodstuffs was, according to them, mainly responsible for the outbreak of the disease. DR. BUDD, moreover, regarded the infective virus as a kind of living fungus which, by multiplication in the intestine, produced vomiting and diarrhoea. In spite of all contradiction and opposition, the views of Drs. SNOW and BUDD were, on the whole, found to be correct and were as a matter of fact, confirmed by the subsequent discovery of comma bacilli—the causative micro-organisms of the disease—in the stools of cholera patients.

This discovery opened up a vast and hitherto unexplored field of research both in respect of prophylaxis and treatment of the disease in a more scientific manner.

Ætiology, Propagation and Prophylaxis.—Cholera is perhaps one of the most dreadful infectious diseases which, when it breaks out in a locality, spreads more rapidly than any other similar malady and plays havoc among the people, unless prompt and vigorous preventive measures are adopted, at the very outset, to combat the ravages of the disease. But no prophylactic measures are likely to be effective or successful without a thorough and comprehensive knowledge regarding the causes of its occurrence and the modes of its propagation among the public. As “prevention is better than cure”, it should be the duty of all medical practitioners to acquaint every layman, as far as possible, with all necessary informations in respect of its:—

- A. Ætiology.
- B. Propagation.
- C. Prophylaxis.

A. **Ætiology.**—It is now undisputedly acknowledged that the comma bacillus is the causative micro-organism of cholera. But in order to understand the causes of its occurrence and the method of its dissemination among the people in a locality either in a sporadic or in an epidemic form, it is absolutely necessary to have a comprehensive knowledge and thorough grasp in respect of the following factors:—

- I. Sources of Infection.
- II. Predisposing Causes.

I. **Sources of Infection.**—As the primary seat of the disease is in the upper part of the small intestine, namely, the duodenum and the jejunum, it is evident that the bacilli must, in order to reach this site, pass through the stomach; in other words, the infection must be caused by the ingestion of such articles of food or drink as are already contaminated with the causative micro-organisms. Of the numerous sources of infection, the following are the most important:—

- (1) Excreta of cholera-patients, especially the stools,

- (2) Cholera Carriers.
- (3) Contaminated Water.
- (4) Infected Foods.
- (5) Fomites.
- (6) Infected Soil.
- (7) Flies.
- (8) Nurses and Attendants.

1. **Excreta of Cholera Patients:**—All evacuations, namely the vomits and stools—especially the latter—contain usually a very large number of comma bacilli. Indiscriminate disposal of these evacuations, without proper and thorough disinfection, is always a dangerous source of infection to the people of a locality.

2. **Cholera Carriers:**—They are probably responsible for the disease in a place where no other source of infection can be traced for the outbreak of cholera. It is a well known fact that a carrier may harbour in his intestine and pass in his stools a very large number often of a most virulent strain of comma bacilli without himself showing any sign or symptom of the disease. Hence such a person is always a fruitful means of infection to others. When appointed as a servant or a cook in a household, the carrier remains as a constant source of danger to the family.

3. **Contaminated Water:**—It has now been well-established that cholera is a water-borne disease and that the comma bacilli can live in water and remain infective, under suitable circumstances, for a considerable period. Contamination of drinking water, which had in the past been responsible for many a dangerous and widespread epidemic in various countries, occurs usually from washing and cleaning of bed-pans, urinals and other infected articles such as linens, beddings etc., in the tanks, reservoirs, streams, rivers etc., the water of which is used for drinking purpose. The river water has also been found to be contaminated by the throwing into it of dead bodies of cholera patients. The infection of stagnant water such as that of tanks and reservoirs usually causes an outbreak within a limited area whereas that of the running water such as that of a river or stream results as a rule in a riparian epidemic, extending over a large area, along its banks as the infection is carried down by the current for a long distance from the source of contamination.

4. **Infected Food:**—Food both cooked and uncooked may easily become infected from various sources and as such it may be a potent factor for the dissemination of the disease as described below:—

(a) **Milk:**—Milk is one of the common sources of danger; for it is very often infected as a result of adulteration with contaminated water by unscrupulous dealers or vendors, though it is not unusual to meet with infection of milk like that of other articles of food. When left exposed, the flies may carry the bacilli into it from the excreta of cholera patients. Accidental infection may also occur from washing the milk can with contaminated water. As the milk is a very good

and suitable medium for the growth and multiplication of comma bacilli, it is always found to be a dangerous and common source of infection.

(b) Other articles of food both uncooked vegetables or fruits may be the sources of infection. Contamination usually results from the infected soil or water. If left exposed, flies may also carry infection to even the cooked food which is otherwise quite safe. Various other articles of food such as ice, ice-cream etc. have been mentioned elsewhere as sources of danger.

5. *Fomites*:—Beddings, clothings and other linens, used by or for the patient, are usually contaminated and may remain a dangerous source of infection for a considerably long time in moist condition, unless properly sterilized or disinfected. Washing of these articles in ponds, tanks, streams, rivers etc, may help to spread the disease by contaminating the water thereof.

6. *Infected Soil*:—Comma bacilli cannot live long on the surface of the soil as direct exposure to the sun kills them very quickly but they may live, for a long time, a few inches below the surface if the soil is moist, and thus they may, occasionally, be a source of infection.

7. *Flies*:—Owing to their filthy habit, flies may be a dangerous source of infection. They usually carry the infection from the excreta of cholera-patients to both cooked and uncooked foods if left exposed.

8. *Nurses and attendants of cholera patients* may, through carelessness on their part, infect themselves or others with whom they may come in contact. Hence, on no account, they should be allowed to mix with other members of the family without thoroughly disinfecting their hand and changing their clothings.

II. *Predisposing Causes*.—The fact, that the ingestion even of contaminated food or drink does not always produce the signs and symptoms of cholera, may easily be explained by the absence of predisposing factors, without which the bacilli are either killed or made impotent by the protective mechanism of the body and so they fail to produce the disease. These may be considered under the following two heads:—

(1) Inhibition of Normal Gastric Juice

(2) Lowering of the Resisting Power of an Individual

1. *Inhibition of Normal Gastric Juice*:—The comma bacilli are usually destroyed in the stomach of healthy persons owing to the presence in it of normal gastric juice which invariably contains free hydrochloric acid as one of its constituents. This acid, acting like all other acids and antiseptics outside the body as mentioned elsewhere, becomes not only inimical to the growth of but positively destructive to the comma bacilli. Stomach, therefore, especially in a healthy person, acts ordinarily as a natural barrier to the passage of these micro-organisms through it. So, inhibition or alteration of gastric juice,

due to any cause whatsoever, is an essential factor to produce the disease. Ingestion of a large quantity of contaminated cold water or infected food, as well as when a person is in fright or is suffering from any disorder or disease of the stomach which inhibits or alters the composition of the gastric juice, may very often lead to an attack of cholera.

2. *Lowering of the Resisting Power of an Individual*:—This is an important factor; for as long as the resisting power remains high, the comma bacilli, even if they find access to the intestine of an individual by some means or other, fail to produce the disease in him. The germs, in this condition, either die out completely or lie in a dormant or inactive state till they find a suitable opportunity for their growth and development as a result of the lowering of the resisting power from one or more of the following circumstances especially during an epidemic of cholera:—(a) Exposure to chill; (b) Fasting; (c) Saline purgatives; (d) Susceptibility.

(a) *Exposure to Chill*:—It is a well known fact that sudden exposure to chill increases the susceptibility of an individual to almost all kinds of specific infections as well as various other ailments. Chill in the abdomen has been found on many occasion, to cause gastro-enteritis producing diarrhoea and vomiting resulting from more or less congestion of the mucous membrane of the gastro-intestinal tract. Abdominal chill is, therefore, a potent factor for the development of cholera in a person harbouring comma bacilli in the intestine especially during an epidemic, when other factors may not only contribute but also play an important part, at least to some extent, in lowering the resisting power of the individual.

(b) *Fasting*:—This condition not only lowers the resisting power of a person but also inhibits the secretion of the gastric juice. Thus it increases the liability to an attack of cholera, especially, in case of one who is attending to or coming in contact with a cholera patient.

(c) *Saline Purgatives*:—These, or as a matter of fact, all hydragogue purgatives have, during an epidemic of cholera, been found, at least in some cases, to precipitate an attack of the disease. The only explanation for this, however unsatisfactory or unconvincing it may be, is that the mucous membrane of the intestine is probably rendered more vulnerable to and suitable for the growth, development and multiplication of comma bacilli in it.

(d) *Susceptibility*:—A new-comer to a cholera infected area is, as a rule, found to be more susceptible to the disease than one who is a permanent resident of the place. This is probably due to the development of a certain degree of immunity by the people, born and brought up in an endemic area, from slow and repeated infections by small doses of the bacilli—too small to produce the signs and symptoms of the disease—during successive outbreaks of cholera in the locality.

B. Propagation.—See under Epidemiology and Mode of Dissemination.

C. Prophylaxis.—From what has already been stated above, it is quite obvious that the timely adoption of precautionary measures against the sources of infection as well as predisposing causes not only protects an individual from an attack of the disease but their strict observance is likely to prevent or cut short an outbreak of cholera both in the sporadic and epidemic forms. These measures may, for the sake of convenience, be divided into the following two groups:—

I. General Prophylaxis

II. Individual Precautions.

I. General Prophylaxes are:—

- (1) Isolation or Segregation of the Patient
- (2) Disinfection or Incineration of the Excreta.
- (3) Destruction or Sterilization of the Articles used by or for the Patient.
- (4) Detection and Segregation of the Carriers.

1. *Isolation or Segregation of the Patient*:—This is very important; for, unless special precaution is taken, any one, coming in contact with the patient, may get the disease himself or carry the infection to others, who may fall victim to it. Hence, none but the nurses or attendants should be allowed, as far as possible, to have access to or look after the patient or even to handle the articles used by or for the patient.

2. *Disinfection or Incineration of the Excreta*:—It is essential either to disinfect thoroughly or still better to incinerate evacuations of the cholera patients, as these may, owing to careless and indiscriminate disposal, be responsible for the dissemination of the disease in the locality.

3. *Destruction or Sterilization of the Articles used by or for the Patient*:—Beddings, clothings etc., should be burnt or thoroughly disinfected, as they almost always carry infection and may help to spread the disease under favourable circumstances as already mentioned.

4. *Detection and Segregation of the "Carriers"*:—Being an unknown source of infection, the "carriers" are looked upon as more dangerous than other known sources of infections. Detection of a "carrier" is only possible by the repeated culture of the stool or bacteriological examination of their blood-serum; once detected, a "carrier" should always be segregated till he is found to be free from infective germs viz. comma bacilli.

II. *Individual Protections.*—Following measures should be adopted for individual protection:—

- (1) General Health.
- (2) Inoculation of Cholera Vaccine.
- (3) Food and Drink.
- (4) Emptiness of Stomach.

1. *General Health*:—This should be maintained as best as possible by strictly observing the hygienic rules.

2. *Inoculation of Cholera Vaccine*:—All unprotected persons should, if possible, be inoculated, especially during an epidemic. It, undoubtedly, gives a very high protection to the individual though for a short time. The incidence of the disease among the inoculated is found to be very much less than among the unprotected, though inoculation has no effect on the severity of an attack.

3. *Food and Drink*:—All foods and drinks, especially milk and water, should be cooked and boiled, as the case may be, and should be so protected that the flies and other insects may not have access to them. Fruits and vegetables, which cannot be boiled and are usually eaten raw, should, if possible, be disinfected and protected from contamination, once they are made ready for consumption.

4. *Emptiness of Stomach*:—No one should be allowed to attend, nurse or come in contact with a cholera-patient in empty stomach, especially if he is of nervous temperament, as no secretion of gastric juice occurs while the stomach is empty; so the liability to an attack of the disease is aggravated in case the bacilli can gain entrance to the stomach, while it is empty.

Report of Excretion of Quinine in the Urine based on 76 Observations*

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WORKING for a big commercial concern in a malarial place, where many thousands of workers are employed, we started mass administration of Quinine with the idea of keeping the employees free from malaria and thereby increasing the number of effective working days per worker to the benefit of the employer Company. While engaged in this prophylactic work, we came across a certain number of cases who suffered from malarial fever (clinically and microscopically positive), in spite of prophylactically taking Quinine regularly as advised. They solemnly asserted that they were taking Quinine regularly for the last few days as advised. This version, when it came from lower class of employees such as coolies, was not taken as true, but when it came from higher class of employees such as clerks in

* Specially contributed to 'The Antiseptic'.

responsible positions, could not very well be so lightly treated. It set us thinking and we wanted to test the truth of their statement, by examining their urine to find out if Quinine was excreted with it. Our procedure was as follows: We administered Quinine to these cases personally and saw to it that the medicine was swallowed. Before administration of Quinine, their urine was examined and cases of albuminuria and the cases who were taking quinine previously and, in consequence, were giving positive reaction to Tanret-Meyer test were rejected. Quinine was given on an empty stomach, and the urine of the patients collected hourly and examined and the findings were noted. Tanret-Meyer reagent was used in all these cases for detection of Quinine in urine. The results of our observations are appended in tabular form. These observations were mostly confined to indoor cases, not only of malaria but of all sorts, and to outdoor cases who could be kept under watch during the period of observation. It may be noted that in spite of strict watch being kept over patients, there were certain cases where their urine could not be collected for the final test.

From our findings, we have noted the following interesting facts:—

1. The individual varies as regards the time of commencement of excretion. Some were always late (Ref. observation Nos. *1A, 4A, 8A, the same case, and 501, 511, 521, 531, another case), others excreted much earlier (Ref. observation Nos. 19B, 20B, one case, and 63M, & 64M, another case, taking only one hour for excretion to start).

2. The same individual varies on different days. (Ref. obs. 1A, he took 8 hrs. on one day, and obs. 2A, when on another day, he took only 2½ hrs.).

3. Shortest time of beginning of excretion was 1 hr. and the longest 12 hrs. obs. No. 8 A).

4. Some cases, sometimes, do not excrete Quinine at all, perhaps in sufficient quantities, to be detectable by Tanret-Meyer test (Ref. obs. Nos. 67N, and 68 O).

5. Larger doses of Quinine administered resulted in earlier excretion than smaller doses.

6. Different salts of Quinine vary in their time of appearance in urine.

7. Combination of Cinchona Febrifuge, Quinine Sulphate, and Magnesium Sulphate, as ordinarily given to out-door patients seem usually to be the best combination by which Quinine begins to be excreted early and remains in circulation long.

8. Total time taken in complete excretion also varies, in one case, it was only 45 minutes, (obs. No. 52 I), in another 24 hrs. (obs. 59 K).

9. Quinine Bi-hydrochlor takes a comparatively longer time for its excretion. (obs. Nos. 20 B, and 24 C.)

* The capital letters after numbers indicate one and the same patient. The numbers indicate the numbers of observations.

Number of Observa- tion.	Salt of Quinine administered.	Time of admini- stration.	Time of first detection of Quinine in Urine.	Time taken between administra- tion and detection.	Time of last detection of Quinine in Urine.	Total time taken for complete excretion.
1 A	Sulph. gr. 1	9.0 hours.	Not detected in urine on hourly examination till 17.0 hours.			
2 A	Sulph. gr. 5	9.0 hours.	11.30	2½ hours	16.0 hours	4½ hours
3 A	do.	do.	do.	do.	15.30	4 "
4 A	do.	8.25	Not detected in urine on hourly examination till 17.30 hours.			
5 A	do.	8.0	do.	do.	do.	do.
6 A	Febrifuge Sulph. gr. 3 each	8.15	10.30	2½ hours	Positive at 16.0; Negative at 17.0	Between 5½ and 6½ hrs.
7 A	Febrifuge + Sulph.	8.10	10.0	1.50	17.0	7 hours.
8 A	Bi-hydrochlor gr. 5.	8.13	Not detected in urine till 20.0 hours on hourly examination. So it took about 12 hours to appear in urine. Exact time of total excretion not noted.			
9 A	Sulph. gr. 7½.	8.13	11.30	3.17	18.0	6½ hrs.
10 A	do.	8.0	10.15	2.15	18.15	8 "
11 A	Febrifuge Sulph. gr 3 each	8.0	11.15	3.15	17.0	About 6 hrs.
12 A	do.	8.35	12.10	3.35	17.0	" 5 hrs.
13 A	Cinch. Feb. and Q. Sulph. gr. 3 each.	8.20	12.0	3.40	17.0	5 hrs.
14 A	Quinine Sulph. gr. x.	8.10	10.0	1.50	18.0 (Still a faint trace.)	About 8 hrs.
15 A Nos. 1-15 the same patient	Cinch. Feb. and Q. Sulph. grs. 3 each.	8.45	11.0	2.15	17.0 (Still a faint trace.)	About 6 hrs.
16 B	do.	8.10	9.45	1.35	15.30	" 6 hrs.
17 B	Q. Sulph. grs. 5.	14.30	16.0	1.30	Not examined. 14.30	—
18 B	do. grs. 6.	8.15	9.40	1.25	14.30	" 5 hrs.
19 B	do. and Mag. Sulph. 1 dr.	8.0	9.0	1.0	15.0	" 6 hrs.
20 B 16-20 same patient	Q. Bi-hydrochlor.	8.13	9.13	1.0	20.0 (Still a faint trace.)	" 11 hrs.
21 C	Q. Sulph. gr. 5.	8.15	No Quinine detected in urine on hourly examination till 18.30 hrs. Not examined after that.			
22 C	Cinch. Feb. and Q. Sulph. grs. 3 each.	8.15	9.30	1.15	17.0 (Still a mere trace.)	7½ hrs.

Number of Observation.	Salt of Quinine administered.	Time of administration.	Time of first detection of Quinine in Urine.	Time taken between administration and detection.	Time of last detection of Quinine in Urine.	Total time taken for complete excretion.
23 C	Cinch. Feb. + Mag. Sulph. 1 dr.	8.0	10.0	2.0	17.0 hrs. (Strongly positive still. Not examined after this).	
24 C	Q. Bihydrochlor grs. 5.	8.13	12.13	4.0	22.0 hrs. (still strongly positive.)	More than 10 hrs.
25 C	Q. Sulph. grs. 5.	8.13	11.30	3.17	18.0	6½ hrs.
26 C	Q. Sulph. grs. 5.	8.0	11.30	3.30	17.0	5.30 hrs.
27 C	Cinch. Feb. and Q. Sulph. grs. 3 each.	8.15	9.30	1.15	17.10	8.40 "
28 C	do.	8.35	10.10	1.35	17.0	6.50 "
29 C	do.	8.30	10.40	2.10	16.0	4.30 "
30 C	do.	8.45	11.0	2.15	17.0	6.0 "
31 C 21-31 same patient	do.	8.0	11.30	3.30	16.0	4.30 "
32 D	do.	8.0	10.0	2.0	17.0	7.0 "
33 D	do.	8.15	11.15	3.0	17.15	6.0 "
34 D	do.	8.0	10.40	2.40	16.0	5.20 "
35 D 32-35 same patient	do.	8.35	12.15	3.40	17.10. (Still faintly positive. Not examined after this).	
36 E	do.	8.15	11.15	3.0	17.0	About 6 hrs.
37 F	do.	8.35	12.10	3.35	17.0	4.50 hrs.
38 F	do.	8.10	10.30	2.20	16.0	5½ hrs.
39 F	do.	8.10	11.30	3.20	At 16.30. (Still strongly positive. Not examined after that.)	
40 F	do.	8.15	11.15	3.0	17.0	About 6 hrs.
41 G	do.	8.35	10.25	1.50	At 17.10. (Still strongly positive. Not examined after this.)	
42 G	do.	8.30	9.40	1.10	do.	
43 G	do.	8.0	9.30	1.30	17.0	7.30 hrs.
44 G	do.	8.30	9.45	1.15	At 17.0. (Still strongly positive, and not examined after this.)	
45 H	do.	8.15	11.15	3.0	17.15	6.0 hrs.

Number of Observation.	Salt of Quinine administered.	Time of administration.	Time of first detection of Quinine in Urine.	Time taken between administration and detection.	Time of last detection of Quinine in Urine.	Total time taken for complete excretion.
46 H	Cinch. Feb. and Q. Sulph. grs. 3 each.	8.35	10.25	1.50	17.30	7.5 hrs.
47 H	do.	8.30	10.45	2.15	17.10	6-25 "
48 H	do.	8.0	9.30	1.30	17.0	7-30 "
49 H	do.	8.45	10.50	2.5	At 17.10 still positive, and urine not examined after this	
50 I	do.	8.15	16.20	8.5	Patient absconded at about 17.0 hours.	
51 I	do.	8.35	17 15 could not be detected up to this time.	8.40 must be more than this time	At 8.0 hours next morning still strongly positive: could not be examined after this.	
52 I	do.	8.30	16.15	7.45	17.0	About 45 minutes only.
53 I	do.	8.30	No quinine was detected in the urine on hourly examinations till 17.30 hours.			
54 J	do.	7.0	Could not be examined.	—	Strongly positive at 6.30 and negative at 8.0.	23½ to 25 hrs.
55 I	do. (two doses at one time).	8.0	11.20	3.20	16.0	4-40 hrs.
56 J	Quinine Sulph. grs. 6 dose.	T.D.S.—last dose at 16.0	Not examined.	—	Strongly positive till 6.0 next morning.	More than 14 hrs.
57 J	Quinine Sulph. & Cinch. Feb. grs. 3 each in each dose.	do.	do.	—	Strongly positive till 8.10 next morning.	More than 16 hrs.
58 K	do.	do.	do.	—	do.	do.
59 K	do.—1 dose.	7.0	—	—	Negative at 7 hrs. next morning.	About 24 hrs.
60 L	do. do.	6.0	8.0	2.0	13.0	5 hrs.
61 L	do. do.	6.0	8.0	2.0	4.0 next morning	20 hrs.
62 M	do. grs. 3 each dose.	5.45	7.0	1.15	14.0	7 hrs.
63 M	do.	6.0	7.0	1.0	10.0	3 "
64 M	do.	6.0	7.0	1.0	11.0	4 "
65 M	do.	6.0	8.0	2.0	10.0	2 "
66 K	Q. Sulph. grs. 5.	T.D.S.—last dose at 16.0	—	—	Q. detected till 6.0 next morning.	About 14 hrs.
67 N	do.—1 dose.	6.30	Quinine was not detected in the urine at all.			
68 O	do.	6.30	do.	do.	do.	do.
69 P	do.	6.5	8.5	2.0	17.35	9-30 hrs.
70 L	do.	6.0	8.0	2.0	10.0	2 hrs.
71 E	Quinine Sulph. grs. 5.	8.13	10.45	2.32	18.0	7-15 hrs.
72 E	do.	8.0	9.45	1.45	17.0	7-15 "
73 F	do.	8.0	11.30	3.30	16.10	4-40 "
74 G	do.	9.0	11.45	2.45	At 17.10 still strongly positive. Not examined after this.	More than 5-25 hrs.
75 G	Q. Sulph. and Cinch. Feb. grs. 3 each.	8-15	11.15	3.0	17.10	About 6 hrs
76 E	do.	8.35	11.25	2.50	17.0	5-35 hrs.

Genito-Urinary Diseases of Pregnancy

BY

M. Shiva Rao, L.R.C.P. & S., L.M., L.F.P. & S.

Mangalore

I. Pyelitis of Pregnancy.—This is a common affection in pregnancy in this part of the country and the general practitioner in the mofussil is far from being a stranger to it. Curiously, it often eludes the busy doctor with a large 'fever-practice'. Therefore, in every case of fever in an expectant mother, one has to think of pyelitis first and foremost.

Pathology.—It is more common in the primipara than in the multipara. The ureter affected, usually the right, is dilated and atonic above the brim of the pelvis, due to compression by the uterus, which causes stasis of urine, predisposing to B. Coli infection. This affection is characterised by catarrhal inflammation of the pelvis of the kidney, ureter and sometimes bladder.

Sources of infection.—1. *Urinary Tract*—Infection ascends from the vagina, cervix and bladder.

2. *Blood Stream.*

As *Streptococcus faecalis* is never found in pyelitis, infection from the bowel can be ruled out.

Symptoms and Diagnosis.—Main points for diagnosis are three: (1) Fever. (2) Pyuria (with B. Coli found on culture) (3) Pain and tenderness in the kidney region. Symptoms may appear in any month but generally, they come on in the 5th, 7th, and 8th.

1. *Shivering and Fever:*—The attacks may come on periodically like attacks of malaria subsiding in 2 or 3 days. Or the fever may continue for a fortnight or more simulating typhoid. Sometimes, it is irregular leading to a suspicion of tuberculosis of the kidney.

2. *Pyuria:*—A catheter specimen of urine should be centrifuged in every suspected case and the deposit examined under the microscope when pus cells, red blood cells and tube-casts may be found. A culture should also be made. Symptoms of cystitis may be prominent in some cases leading to a suspicion of gonorrhœal cystitis dysuria, frequency of micturition, tenesmus &c.,

3. *Pain in the Loins or Abdomen:*—Sometimes, it is very acute simulating 'acute abdomen' or renal colic.

4. *P. V.:*—Under the base of the bladder and anterior vaginal wall, the thickened ureter may be felt by the finger. Usually, it is the right one and it may be felt as a cord acutely tender.

The symptoms in acute cases subside in 3 or 4 days; in sub-acute ones, they may run on for 3 or more weeks.

Prognosis is generally good. Rarely death may be caused by pyæmia or septicæmia. About half the number get relapses. Abortion or premature labour may occur.

Differential Diagnosis.

Appendicitis	Pyelitis
1. Pain—in McBurney's point, or below umbilicus.	1. Pain—over kidney and along ureter.
2. Gastro-intestinal symptoms.	2. Genito-urinary symptoms.
3. Urine clear.	3. Urine contains pus.
Renal Calculus	Pyelitis
1. Fever—usually absent.	1. Fever and shivering present.
2. Pain—sudden onset, paroxysmal.	2. Pain—gradual and continuous.
3. Pyuria—absent.	3. Pyuria constant.
4. X-ray—shadow of stone.	4. No shadow of stone.
Malarial Fever	Pyelitis
1. Pain in loins—Nil.	1. Present.
2. Urine clear.	2. Pyuria.
3. Parasite in blood.	3. Nil.
Typhoid Fever	Pyelitis
1. Pain not marked.	1. Present and marked.
2. Urine clear.	2. Pyuria.
3. Leucopenia.	3. Leucocytosis.
4. Widal's Reaction plus.	4. Minus.
Gonorrhœa	Pyelitis
1. Urinary deposit—Gonococci.	1. B. Coli.
2. History of Gonorrhœa.	2. Nil.
3. Fever—Rare.	3. Marked.
Tuberculosis	Pyelitis
1. Urine clear.	1. Deposit contains B. Coli and pus.
2. Other symptoms of tuberculosis are present.	2. These symptoms are not present.

Treatment.—*General:*—1. Rest in bed as long as there is fever.

2. Hot fomentations to loins.

3. Warm vaginal douches, irrigation of bladder daily with warm Boric lotion, colonic irrigation.

4. Catheterisation of ureter if there is suppression of pus in the urine and rise of temperature. This has to be done by a specialist of course.

Diet:—Milk and light solids. No spices and hot curries. Fruits, glucose, buttermilk and water of tender cocoanuts may be given with advantage.

Medicines.—Formerly, the writer used Cylotropin injections and Neotropin by mouth. Bacillus Coli Vaccines (stock vaccines) beginning with 5 million dose. They answered well in many cases. Now-a-days in ordinary cases, the following prescriptions meet all requirements:—

1. $\mathcal{R}$ Pot. Citras ... 3 i
Tr. Hyoscyamus ... m v
Aq. ad. ... 3 i

To be given every 2 hours on the first day, every 3 hours on the 2nd day, every 4 hours on the 3rd day, to be continued till the reaction of the urine becomes *strongly alkaline*.

2. The writer had not had much necessity to use *Mandelic Acid* which upsets some stomachs, nor the *ketogenic diet* which many cannot stomach.

- $\mathcal{R}$
- Mandelic Acid ... grs. 48
-
- Sodii Bicarb ... grs. 24
-
- Aq. ad. ... 3 i—t. d.

Follow each dose by Am. Chl. grs. xv in capsule.

This may be tried 3 or 4 days, till the urine becomes *strongly acid*.

3. $\mathcal{R}$ Sulphanilamide 0.5 gm. t.d. for 5 days.

The writer in some cases met with dramatic results. If this drug can be used freely in all such cases, the treatment would be remarkably simplified. However, it has to stand the test of time.

Pyelitis in Puerperium.—Generally, fever may occur about the 5th day. Usually, it is mild and intermittent. In severe cases, it runs high and is attended with rigors, and becomes sometimes a pyelonephritis which is dangerous.

Differential Diagnosis.—This of course depends on (1) *cultures* made from (a) Intra-uterine swab (b) Blood (c) Urine and from (2) *Blood count*. *Blood count* gives important indications especially where a laboratory is not within reach to apply cultural tests:—

- (1) Leucopenia — Typhoid or Kala-azar.
- (2) Mononuclear Leucocytes — Malaria.
- (3) Poly-morpho-nuclear with tenderness over Liver — Hepatitis—over Appendix — Appendicitis.
- (4) Eosinophilia — Helminthiasis.

Symptomatically, rigors, abdominal distension, with slow pulse and a clean tongue, suggests B. Coli infection, and also a foul-smelling lochia. A high pulse rate is suggestive of streptococci, and also odourless discharge with high temperature. Usually, about one-third of puerperal morbidity cases are due to B. Coli.

Treatment.—As in ante-natal cases. In puerperal cases, we may give in addition Pituitrin $\frac{1}{2}$ c.c. intra-muscularly t.d. This counteracts the atony and stasis of ureter and promotes drainage of the pelvis and ureter.

II. Pregnancy Kidney or Pre-Eclampsia.—This is a symptom complex occurring in the last four months of pregnancy. It is characterised by albuminuria and may be mistaken for Chr. Bright's disease to which it sometimes leads. Strictly speaking, it is a toxæmia.

Unrecognised in early stages and neglected, it may end fatally in eclamptic convulsions. As the disease is so common, practitioners have to keep a close look-out for it.

It occurs in one case of pregnancy out of every fifteen. It is more common in the primipara and in association with hydramnios, twins and vesicular mole.

Symptoms and Diagnosis.—1. *Blood Pressure*:—If this remains constantly above 130 systolic, it should arouse suspicion. This is the earliest indication of the disease.

2. *Albuminuria*:—Albumin in the urine is next to appear. There may also be casts and r. b. c. in the urine.

3. *Oedema* of legs, face, and later of vulva and abdomen.

4. *Increase of Weight*:—An increase of 5 lbs. in any month or a total of 20 lbs. is a certain indication.

5. *Headache, dizziness, epigastric pain* and rarely sudden blindness are others signs.

A Rule of Practice:—From the sixth month onwards, every week or fortnight, weight and blood pressure should be taken and urine should be examined for albumin and every complaint of headache, dropsy &c., noted with attention.

The differential Diagnosis from Chr. Nephritis:

Preg. Kidney	Chr. Nephritis
1. Prev. history—Good health.	Attacks of œdema or dysentery.
2. Para—Primi.	Multipara.
3. Age—Younger.	Older.
4. Onset—In late pregnancy.	In early pregnancy.
5. Abortion—Rare.	Common.
6. Jaundice—Sometimes.	Very rare.
7. Bl. Pr.—High, not prolonged.	High but prolonged.
8. Urine—Diminished quantity; High Sp. Gr.; Albumin +.	Increased quantity; Low Sp. Gr.; slight.
9. Convulsions—Eclamptic. No convulsions before pregnancy.	Uræmic. May have occurred before pregnancy.
10. After-effects:—Rare, except in next pregnancy.	Constant.

Treatment.—General :—Rest in bed till blood pressure remains normal.

Diet :—Only water or fruit juice for 4 days. Tender cocoanut water. No salt. Milk added cautiously after 5 days or buttermilk. Diet should be advanced by noting improvement in blood pressure and albuminuria.

Medicinal :—

℞ Sodii Bicarb. ... grs. xxx
Pot. Citras. ... grs. xxx
Aq. Cinnam. ... 3 i four hourly doses.

℞ Calcium Gluconate or Lactate 10 grs. t.d.s.

℞ Calcium Gluconate 10 p.c. Soln. 10 c.c. intramuscular, on alternate days.

℞ Extra. Corp. Lut. 1 amp. intramuscular for 4 successive days.

This treatment effectively wards off convulsions and reduces albumin in the urine.

Prognosis :—Immediate: good, if *immediate treatment* is instituted, better in a hospital or nursing home under proper attention than at home.

To Child: unfavourable.

Indications for Induction of Labour :—(1) Alb. in urine loaded. (2) B. P. high and constant. A B. P. above 140 systolic for 4 days is an urgent indication. (3) Headache, severe and constant. (4) Vomiting and jaundice. Of course, the method and time of induction should be decided by the expert consulted.

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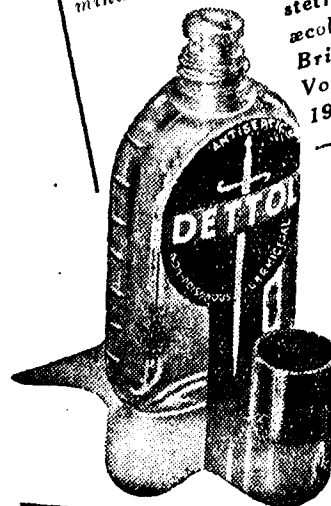
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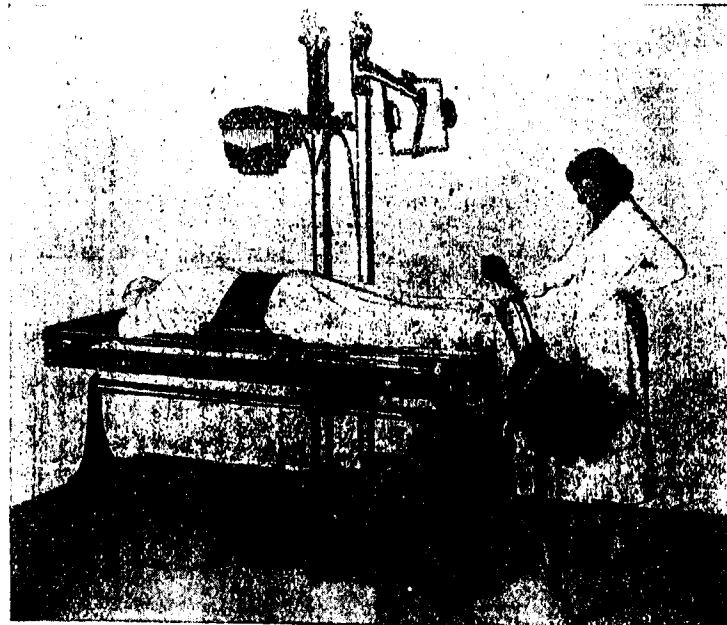


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N. Krishnaswami, I.M. & S.,

R. S. Puram, Coimbatore.

RETARDATION of the absorption of injected insulin has been attempted by various additions such as gum arabic and emulsions of olive oil. Their use has not survived more or less lengthy clinical experimentation since they induced hypoglycæmic shocks due to their irregular absorption.

Another method of slowing and prolonging the action of insulin had been previously tried by giving it in conjunction with Pituitrin. The most favoured method is to bring about a delayed insulin action by combination of insulin with albuminous bodies and allied substances. HAGEDORN's research has been foremost in furthering these attempts. By binding insulin to protamine, a preparation is obtained which is absorbed at a slower rate than a water soluble insulin.

HAGEDORN's method of combining insulin with protamine and giving it in suspension seems to offer the greatest advantages. His original aim was to alter the iso-electric point of ordinary insulin to that of the tissue fluid. He finds the combination to be stable for many weeks and in cold storage for even months.

SCOTT's investigations have shown that a crystalline zinc insulinate is likewise less quickly absorbed by the organism. Consequently, zinc has been added to the protamine insulin. It is stated that the precipitated water insoluble insulinate with a PH of 7.3 remains at the site of injection up to 10 hours. HAGEDORN agrees with SCOTT that the addition of zinc further stabilizes the protamine insulin.

When ordinary insulin causes too sudden a fall of blood sugar, this more slowly acting preparation is indicated. But one should favour the continued use of ordinary insulin as well, as protamine insulin is incapable of preventing a very high alimentary rise.

LAWRENCE and ARCHER note some variability in the action of zinc protamine insulin from day to day, presumably dependent on its rate of absorption which is not only slower but more variable from a suspension than from a solution.

Giving the zinc insulin at bed time has the advantage that it exerts its minimum action during rest and its maximum during the intake of food. But even then, there will be heavy glycosuria after the evening meal. So, most patients are better controlled when zinc protamine insulin is given before breakfast rather than at bed time. If ordinary insulin has to be added, the mixed dose should never be given at night since it would result certainly in hypoglycæmia.

On changing from old insulin to new, it is better to follow this plan. A basal dose of new insulin of three quarters of the previous

* Specially contributed to 'The Antiseptic'.

dose of soluble insulin but not more than forty units together with half the previous morning dose of soluble insulin which is gradually adjusted, reduced or omitted, as the basal dose comes into full action.

Zinc protamine insulin is very useful in preventing relapse in diabetic coma, when given subcutaneously in addition to intravenous or subcutaneous ordinary insulin. Ketosis is much more readily controlled by the new insulin. RABINOWITCH and others are of opinion that protamine insulins are specially useful in the case of 'insulin wasters' i.e. those who cannot make full use of ordinary insulin. The protamine insulins diminish the cholesterol content of the plasma and prevent the fatty infiltration of the liver better than ordinary insulin.

As to its surgical applications, A. F. FOWLER and others find that by proper dosage the action of protamine zinc insulin can be sufficiently prolonged by single daily injections to permit the use of intravenous glucose, to promote the healing of wounds and the clearing up of cellulitis and gangrene without operation.

Few physicians are not satisfied that the new insulin has sufficient advantage over the ordinary to justify its substitution. A more balanced view is expressed by others who are not in favour of substituting one of the new insulins for ordinary insulin unless there is valid objection to multiple doses or there is frequent tendency to hypoglycæmic attacks owing to the too rapid effect of ordinary insulin.

Summary.—(1) *Ordinary Insulin*—Advantages: Constant in effect. Invaluable in Coma. Available in many strengths. Disadvantages: Transient effect. Multiple doses often needed. Liable to produce frequent brief hypoglycæmia.

(2) *Protamine Insulin*—Advantages: More prolonged in effect. Painless in injection. Controls early morning hyperglycæmia. Not more than two doses required daily. Disadvantages: Effect somewhat erratic. Occasional difficulty in controlling glycosuria before lunch. Bulky to administer in large doses.

(3) *Zinc Protamine Insulin*—Advantages: Still more prolonged effect. Will often control even a severe case with one injection daily. Disadvantages: Effect somewhat erratic. May produce unexpected and very prolonged hypoglycæmia. Bulky to administer in large doses.

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Diabetes-Therapy with Special Regard to The Circulatory System

BY

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THERE is a strange thing about diabetic therapy: during the last two decades (that is, since the discovery of Insulin), the treatment has changed several times from the one extreme to the other. In the beginning of the Insulin-era, very little Insulin and few Carbohydrates were given; later on, the patients were allowed to eat as much Carbohydrate as they wanted and the amount of Carbohydrate which was over the tolerance limit had to be neutralized by Insulin. Nowadays, we choose the middle line; we give sufficient Carbohydrate so that no acetonuria occurs and some Insulin if necessary. But this development shows us that diabetic therapy is not at all simple, but has many difficulties and problems.

We usually begin the treatment of a diabetic patient by finding his tolerance limit, that is, after a day or two, without Carbohydrates; we slowly add Carbohydrates till the patient begins to have sugar in the urine. Then his tolerance has been reached. If the Carbohydrates, with which he is sugar-free, are enough to guarantee a reasonable mixed diet and no acetone in the urine occurs, he does not need any Insulin. If more Carbohydrates are necessary, we have to balance those above the tolerance with Insulin. This proceeding can be done only in normal cases without complications. Usually, the equivalent of 2 gm. of pure Carbohydrates is one unit of Insulin. To give a common example: 100 gm. of white bread contains about 53% of Carbohydrates; therefore, about 25 units of Insulin would be needed to compensate this quantity of Carbohydrates. If a diabetic patient has a temperature or an infection, e.g., boil, carbuncle, pneumonia, typhoid, cystitis, his blood sugar must be carefully watched and the Insulin doses have to be greater than they otherwise would be, as the Insulin has not its full effect, probably due to an increase in leucocytes, which we assume are able to destroy the Insulin. Any infection may cause a coma diabeticum, if not watched carefully from the beginning. Furthermore, if a patient comes for treatment and has much acetone or even diabetic acid in his urine, he has to be treated at once with Insulin, as this acetonuria is a sign of grave danger, and a Carbohydrate-free day would increase the acetone and bring the patient very likely into a coma diabeticum.

Another complication and perhaps the most frequent one, threatens from the circulatory system. Diabetics are inclined to get an early arteriosclerosis with all the consequences of such, especially gangrene of the feet. Unfortunately, we are not very successful in our gangrene treatment as we cannot repair the blood vessels, but we

can help prevent gangrene by giving Insulin in good time, even if the blood sugar is not especially high. As soon as there are complaints about coldness of a toe, or pain, we have to give Insulin. More difficult is the question of Insulin-therapy when the sclerosis is in the heart-vessels, when the patient suffers from coronary sclerosis. Insulin is said to damage the heart muscle, especially when given in large doses, as is necessary in a coma diabeticum. And it is a fact that we sometimes can cure the actual coma so that the patient has a normal bloodsugar again and no sugar or acetone in the urine, but he dies after some time from a tired heartmuscle or a collapse, which cannot any longer be overcome by stimulants. This occurs almost only in cases in which the coma existed several days before the treatment began and is probably due more to the long standing acidosis than to the Insulin. The treatment of a coronary disease with a simultaneous diabetes has to be very well balanced. Insulin must be given if necessary, but even the slightest hypoglycemia must be avoided at any price, and it is better to let the patient have a little urine-sugar than to give too much Insulin. Sometimes, doctors are afraid to give Insulin in such cases, but they do give a good deal of glucose intravenously as nourishment for the heart muscle and forget that they force the patient by this treatment into a coma, which is, of course, a much greater danger.

Time and again, it has been tried to substitute Insulin by something else which has not to be injected. We must admit that the necessity of injecting Insulin is a great drawback to the diabetic treatment as naturally the patients get tired of the injections and try only too willingly all substitutes. Until now, no Insulin has been found that could be given by mouth, though all great laboratories research on this problem and a warning must be given once more against substitutes. Only recently, a diabetic patient brought me a fresh leaf and asked me to convince myself that the sugar-taste disappears at once from the mouth on eating one of those leaves. We know a number of leaves and chemicals which make the sugar disappear from the urine, but that does not mean that the patient is cured, but only that a chemical reaction occurs, which makes our sugar tests ineffective. If we examine the blood-sugar, we find it uninfluenced, but the patient will leave his diet, as he has apparently no sugar and will easily slide into a coma. It is our task to convince patients that they really have to stick to their injections and not fall into the temptation of a more comfortable substitute.

CASES AND COMMENTS

A case of (?) Acute Miliary Tuberculosis

BY

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H. L., 35 H. M., cultivator, was admitted for the following complaints:—

1. Hæmoptysis—duration 4 days. The onset was a few hours after a village feast. On the first day he coughed out about $\frac{1}{2}$ seer of blood.

2. Hurried breathing—duration 4 days.

No history of any past illness.

On Examination.—Patient was extremely distressed. Temp. 97.4° F., Pulse 128, and Resp. 64 per minute. There were signs of broncho-pneumonia on both the sides, more advanced on the left. Pulmonary second sound was accentuated. B. P. 120 syst. and 70 diast. Sputum was muco-purulent with streaks of blood. Sputum showed plenty of erythrocytes, a few leucocytes, epithelial cells, streptococci, staphylococci, and tubercle bacilli. Blood examinations showed—R. B. C. 4½ millions; W. B. C. 14,150 per c.mm. Poly 87.1. Lympho 10.9. Large mono 2. Hæmoglobin 65%. Urine—clear, acid, sp. gr. 1026. Albumin—copious; Sugar—nil; Acetone bodies—nil. There were numerous erythrocytes, a few leucocytes; granular and hyaline casts. It also showed tubercle bacilli.

The patient died after a week's stay in the hospital. He never got any pyrexia during the whole course of his illness. Skiagram of the chest could not be done as he could not hold his breath even for a very short time. Body could not be available for post-mortem examination.

Discussion.—The onset of the illness was very dramatic—it started suddenly after a feast. There was no history of any past illness.

The amount of blood coughed out strongly suggested the bursting of an aneurysmal dilatation of one of the blood vessels.

Was it a case of acute miliary tuberculosis affecting the lungs and the kidneys, caused as a complication of sudden, severe hæmoptysis? BUHL in 1856 made a statement that acute miliary tuberculosis is a specific infection dependent on the presence in the body of an unencapsulated yellow tubercle or tuberculous cavity in the lungs, and it has the same relation as pyæmia has to suppuration. The patient must have been harbouring tuberculous cavity in the lungs. The

lung's picture was a complication of the hæmoptysis. Primary tuberculosis of the kidneys is very rare. According to WALKER, hæmatogenous infection takes place in 90% of kidney tuberculosis, which would explain the urine picture. The afebrile course of the illness was another point of great importance. He never had a temperature of more than 98° F. Afebrile course in such an acute condition is extremely rare.

Acknowledgements—My thanks are due to Lt-Col. A. N. Bose, M.D., F.R.C.P., Professor of Pathology, P. W. Medical College, Patna, for his very kind permission to publish the reports of the case.

My thanks are also due to Capt. U. M. Gupta and Dr. A. K. Guha, of the Department of Pathology, Medical College, Patna, for their very kind help in doing the laboratory investigations of this case.

Some Suggestive Signs and Symptoms Diagnostic of Diabetes to an Ophthalmologist

BY

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BOLD, not to say lucky, should the diagnostician be, if he could say an ocular lesion was diabetic every time. However, there are a few characteristic lesions of diabetes, e.g., the small punctate hæmorrhages in the deeper layers of the retina, in and about the macula, sometimes with a peripheral distribution, are typical of diabetic hæmorrhages—a picture that once seen is indelible.

Retinal exudates described as "patches with sharp-cut edges, often solid or soapy-looking or waxy, often distributed in an irregular manner" constitute quite a characteristic picture of diabetes.

A limitation in the range of accommodation, incompatible with the age of the patient, or frequent fluctuations in the refraction of the eye, should always be viewed with suspicions by the attending ophthalmologist as likely to be due to glycosuria. Very often, there is no relation between the amount of sugar in the urine and the refraction.

A less common condition but characteristic, is the iritis of diabetes with its yellowish white exudate in the chamber.

In closing, mention may be made of a condition very diagnostic indeed, but at the same time very rare or hardly ever seen with the advent of insulin. The milky white appearance of the retinal vessels coursing ribbon-like and flat in Lipæmia Retinalis was often the precursor of the end.

Double-Infected Venereal Ulcers

BY

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WHEN a male patient comes with an ulcer on the penis, the differential diagnosis in most cases is straightforward and easy. The common possibilities are (a) Traumatic ulcer (b) Herpes (c) Balanitis (d) Hard chancre (e) Gummatous ulcer (f) Tuberculous ulceration (g) Infective granuloma (h) Soft sore (i) Primary sore of Climatic Bubo (j) Aphthous ulceration in unclean people, and (k) Carcinoma.

The points that help to clinch the diagnosis are; (a) History of exposure; (b) The incubation period; (c) The local condition, i.e., the number of ulcers, their position, margins, base etc.; (d) Presence or absence of enlargement of inguinal glands—matting, sinuses, fluctuation etc.; (e) General examination of the patient for secondary rashes etc., and to decide whether the patient is in a fit condition to undergo the treatment e.g. injection of any arsenical is fraught with danger in a patient suffering from heart disease or liver disease, and (f) Serological examination like Wassermann, Kahn, Frie's Test etc.

Each ulcer has its own characteristics and even without laboratory aid, most of the cases can be diagnosed clinically. That should be the case; for, venereals are prevalent widely and in all classes of people; and there are very few people who would go to a public hospital. The cry that "The private treatment of syphilis, as carried out at present in this country, is neither fair to the patient nor to the community" is not altogether true. Only general practitioners can fight the disease in all its aspects. Any socialisation for the diagnosis and treatment of venereal diseases is bound to be a failure, if such socialisation does not include general practitioners to treat poor people free, and to get investigations freely done for them in the State Hospitals.

It is not proposed in this paper to deal exhaustively with the differential diagnosis of the venereal ulcers, except to point out that, in spite of all the diagnostic methods at our disposal, sometimes the diagnosis of an ulcer remains doubtful. It is not commonly realised that a patient can come with a double infection, and, in such a case, the diagnosis becomes very difficult unless this possibility is borne in mind constantly.

The following three cases represent the double-infected venereal ulcers.

A Case of Soft Sore and Hard Sore.—6-6-39. Mr. B., Hindu Male, 25 years, multiple ulcers in the balano-preputial sulcus, clear cut margins, discharging pus. History of exposure 12 days-back. Ulcers appeared 48 hours after exposure. No glandular enlargement in the inguinal regions.

Diagnosis.—Soft Sore.

Treatment.—Hot Acriflavine baths and dressings. Dmeleos (May and Baker) 4 injections were given at 4 days' intervals. On 22/6, the ulcers were healing satisfactorily. The patient discontinued treatment with the hope that the ulcers would heal by themselves. On 23/8, the patient came back with all the ulcers healed except one which was preventing the foreskin to be retracted. Foreskin was oedematous. Acriflavine lotion was syringed in between the glans and the foreskin twice daily. 6 injections of Sodium Antimony Tartrate 2% solution 2 c.c., were given intravenously on alternate days, with the mistaken diagnosis that the ulcer was still a soft sore. On 5-9-39, hard induration was noticed all round the ulcer. Immediately, he was put on a regular course of anti-syphilitic treatment. The induration had melted away within a few days after the first injection; and the ulcer healed completely in about ten days' time.

Though no Wassermann was available, the therapeutic test was so strikingly positive that one can safely make the diagnosis of a hard chancre.

Soft Sore and Hard Chancre.—Mr. R., Hindu male, 35 years, presented himself on 12-2-40. History of exposure 10 days back. Incubation period after exposure 48 hours. Duration one week. Multiple small ulcers with clean cut margins at the balano-preputial sulcus. Very painful, discharging pus.

Diagnosis.—Soft Sore.

Treatment.—Acriflavine baths every day advised. Dmeleos 1 c.c. was given intravenously. Patient had a terrible reaction for 24 hours, in the course of which, he developed extra systoles and præcordial heaviness.

The patient smokes heavily and is an alcoholic.

The patient discontinued treatment for one month. By 27-4-40, he came back with all the ulcers healed except two. Again, the ulcers were given daily hot Acriflavine baths and dressings. Soft-Chancroid Vaccine (U. D. & Co.), was given intramuscularly on alternate days—4 injections. There was no improvement in the ulcers. The two ulcers had coalesced, a big slough separated leaving a deep excavated ulcer, which was excruciatingly painful and bled easily. The dermal test with Ducrey Diagnostic Vaccine was positive. So, 5 injections of Faudin (1 c.c., 1½ c.c., 2 c.c., 2 c.c., 2½ c.c.) were given on alternate days from 10-5-40. Acriflavine dressings were continued.

On 24-5-40, i.e., 3 days after the last Faudin injection, the patient developed rash all over the body. The rash was discreet, bilateral and maculo-papular in type. Suspecting that the rash might be due to Antimony injections, two Liver injections were given and the ulcer was being dressed with codliver oil. The Wassermann came strongly positive on 3-6-40. The ulcer was exposed to infra-red rays in the meantime, thrice on alternate days.

On 4-6-40, Acetylarsan (May and Baker) 1 c.c., was given intramuscularly. The reason why Acetylarsan was chosen was that the patient gave history of having taken Sulfarsenol some years back for sciatica, and that he had terrible reaction for 3 days. It was considered that Acetylarsan was the least toxic of the arsenicals available. Nevertheless, the patient developed high pyrexia i.e., 105° with rigor for about 8 hours. The next day, he had gingivitis—a sign of arsenical toxicosis.

By 7-6-40, the ulcer was red and showed signs of healing. The secondary rash was disappearing. The patient was put on Colloid Iodine by mouth (to avoid iodism for which the patient was very sensitive) and Bismuth injections. After the second Bismuth injection on 14/6, the ulcer was found to be healing satisfactorily, and the secondary rash had almost disappeared. But unfortunately, a week later, he developed acute pain and signs of inflammation at the site of injection and severe sciatic pain on that side. With local fomentations, he was relieved of all the symptoms by 6/7, but he could never take another Bismuth injection.

However, on 9-7-40, he took another Acetylarsan injection 1 c.c., intramuscularly. The patient was prepared this time carefully for full 3 days with Calcium, Glucose etc., before the injection was given. In spite of all the precautions, he had as severe a reaction as after the first injection. Thereafter, the patient had no courage to face another injection. But, the ulcer continued to heal steadily and by the first week of August, it had healed completely.

Here is a case which started as a soft sore but ended as a syphilitic chancre with secondary rash.

In both the cases of soft sore and hard chancre, one fact emerges out well—that is, the incubation period of the two diseases. Both the patients gave history of having developed multiple ulcers within 48 hours or so after exposure—the history so typical of soft sore. It was only a month or so afterwards that the ulcer took an indurated condition as in case number one, and in case number 2, two ulcers coalesced and persisted as a deep excavated ulcer. In the latter case, only the secondary rash could point to a correct diagnosis. It is interesting to note that in both the cases, the syphilitic chancre had not appeared as a fresh sore; but syphilis was engrafted upon one or two residual ulcers of the soft sore. This is the cause, probably, for the non-healing of the residual ulcers. The late manifestation was due to the longer incubation period of syphilis viz., 3 weeks to 3 months. Such ulcers as these do not possess the typical clinical manifestations of a primary syphilitic chancre.

The extreme sensitiveness of the case number 2 to arsenicals is worthy of note. He reacted badly even to minute doses of arsenical injection (Acetylarsan)—so much so, it was found impossible to give him a complete course. The prolonged reaction to Bismuth too is noteworthy. The question naturally arises in these hypersensitive

cases: which type of treatment is the best for them? Have we to content ourselves with Mercurial inunctions only? If arsenic is to be given, in which form and in what manner?

A Case of Hard Chancre and Climatic Bubo.—Mr. P., Hindu. Male, 56 years, presented himself on 31-5-39, with a hard indurated ulcer on the inner aspect of the prepuce. History of exposure about three weeks back. Duration five days. The ulcer was present on the left side. The inguinal glands on the left side were moderately enlarged but discreet and not painful.

Diagnosis.—Hard Chancre.

Treatment.—3 injections of Neosalvarsan 0.3 Gms. were given at 5 day intervals. The ulcer healed completely. The glands have gone down completely after the first injection.

But by 16-6-39, the patient developed afresh enlargement of inguinal glands on both the sides, but more on the left side. They were now matted, tender, and on the left side fluctuating.

A fresh diagnosis of climatic bubo was made. On the left side, the pus was aspirated on alternate days and 1 c.c., of 10% Iodine introduced. Six injections of Sodium Antimony Tartrate 2%, 2 c.c., were given intravenously on alternate days. After two weeks, the whole swelling had gone down, the sinuses that formed after aspiration had healed completely, and the patient was apparently cured. Afterwards, the patient refused to complete the course of Antimony injections.

This case demonstrates a double infection with syphilis and climatic bubo.

The above three cases represent only two combinations. Probably, syphilis and gonorrhœa; gonorrhœa and bubo, and other double infections are quite possible. It may be said that patients contracting double infections are not rare, but are fairly common. These three cases that have come under my care, and possibly many more that have been attended by others, remind any one, treating venereal sores that are resisting ordinary treatment, to bear this possibility constantly in mind.

My thanks are due to Dr. V. P. S. Serma, M.B., B.S., for his helpful criticism during the preparation of this paper; and to Dr. A. Sama Rao, L.M.P., for his constant help in the treatment of the case number two.

How Malaria may affect the course in cases of Traumatic Intra-Cranial Hæmorrhage

BY

B. Gunawardena, L.R.C.P. & S. (EDIN.), L.R.F.P. & S. (GLAS.)

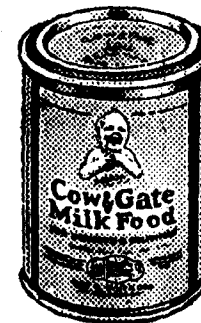
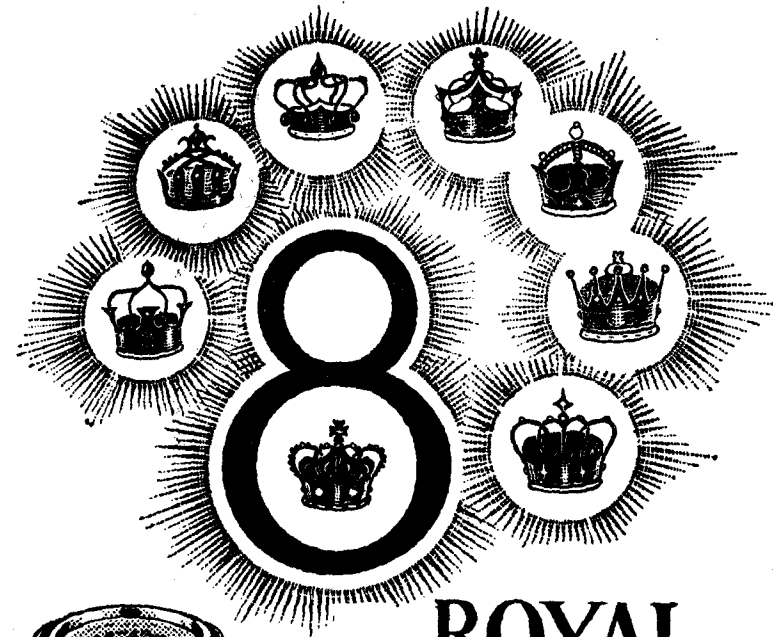
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MALARIA may mask the symptoms and signs in any particular disease. The writer has seen cases where malarial enteritis was about to be mistaken for amœbic dysentery or even cholera. The joint pains of malaria may simulate rheumatism. Colitis, possibly of malarial origin, may be mistaken for appendicular colic. Malarial gastritis at times may puzzle the practitioner in his diagnosis of various intestinal lesions. The case illustrated below is interesting in many respects in that it quite well illustrates how malaria can alter the course of recovery in cases of intra-cranial hæmorrhage.

D. A., male, aged 26, was admitted to Walasmulla Hospital on 22-9-39 with head injuries, the result of an assault with clubs. The patient was a bad malarial subject—having taken treatment on several occasions for attacks of malaria. For three months, however, he had been free from malaria prior to this assault. Amongst several injuries he had on the body, he had on his head a circular contusion of the size of a closed fist over the middle of the right parietal area. Careful examination did not reveal any fracture which was also proved to be so at the post mortem examination. There was a hæmatoma over the area of the contusion. He had a pulse of 68 and was suggestive of having internal bleeding. He was semi conscious at the time of admission and he gradually became unconscious totally as time went on. A careful record of hourly pulse record also confirmed the fact that an immediate operation was necessary; but unfortunately, the relation of the patient refused any surgical interference. At the time of admission, he was restless and was in a state of shock and for this purpose, I ordered gr $\frac{1}{4}$ of Morphia hypodermically. This was also done with a view that, in case the patient's relatives did consent to an operation at a later stage, no Chloroform would be necessary—the writer intending to perform the operation in such a case under local anæsthesia. Chloroform has a lowering effect on the blood pressure in all head operations and it is best avoided. Novocaine infiltration over the site of the trephine opening intended with a preliminary injection of Morphia or Hyoscine and plugging the patient's ears and closing his eyes, are, in the writer's opinion, quite sufficient to carry out a trephine operation quite successfully and the writer had performed several operations of this type with this routine preparation of the patient. At 12.30 P. M. the same day, the patient had a sudden rigor and the temperature, which all this time kept up to normal, shot up to 103° and the pulse, which was keeping all this time slow, began to show signs of an increase. This was the beginning of the danger signal for the patient, as it was quite evident that the shaking

up he had after the rigor and the shooting up of the temperature, are quite sufficient to accelerate the internal bleeding. The state of shock, in which he was on admission, had begun to clear up till the time of this rigor and the stage was set apparently to a quiet subsidence of the hæmorrhage inside but for this attack of his fatal bout of malaria. After the rigor, his pulse began to show that he was again getting into a state of shock and all precautions were taken to combat the same e.g. by giving subcutaneous saline etc. Late in the evening, his relatives consented to the operation and I hurriedly took him up, the patient being still under saline subcutaneously, whilst the operation was in progress, as though he was given the only chance to stop his bleeding internally. It was at one stage thought that it was too late even to open his skull up to investigate the bleeding. A curved incision was made over the area of the contusion and the skull was trephined and the dura was laid open and then a large quantity of blood gushed out and with it practically the patient collapsed again and the operation had to be hurriedly completed and the wound was sutured up and soon after the patient died. The hæmorrhage in this case was uncontrollable and nothing could have been done to him on any account at this stage. A post mortem examination done at a later stage revealed that the blow on the head had ruptured several small sized blood vessels over the right mid parietal area of the brain and there was hæmorrhage from these. There is no doubt that in this particular case, it was the attack of malaria coming on at 12.30 P. M. that had actually increased a hæmorrhage which till then was actually abating and even without an operation, if not for his fatal attack of malaria, this bleeding would have ceased and it is possible that he could have made a complete recovery.

In treating head injuries of this nature, it is very important to keep in mind the factor of malaria in patients subjected to same.



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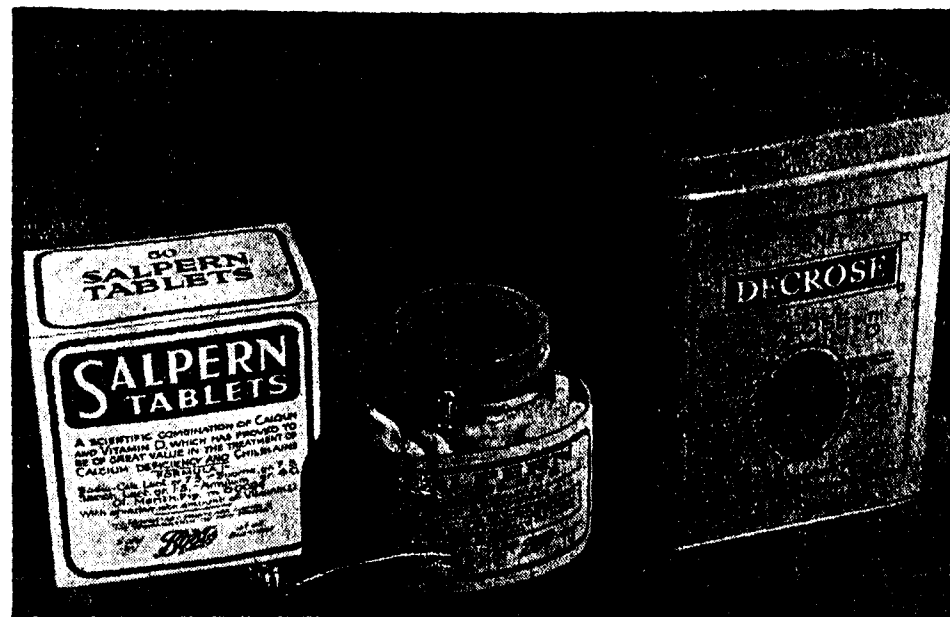
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EDITORIAL

Medical Relief in Madras

ON the occasion of the Annual Prize Distribution of the Madras Medical College, on 30th August '40, at which MAJOR-GENERAL N. M. WILSON, I.M.S., Surgeon-General with the Government of Madras, presided, certain remarks and observations were made by him on the subject of Medical Relief in our Presidency, which, we consider, cannot be left unnoticed in our columns.

In the first place, he deprecated the idea of medical men entering what he called 'party politics'. While he would not deny the fundamental right of every doctor to hold his own opinion on world affairs and matters that concern the well-being of the people, in the wide sense of the word, he would ask him to eschew 'party politics', as he would the devil. Evidently, the Surgeon-General has forgotten that the present-day world politics is pure and unadulterated Democracy, which is 'Government of the people, by the people, for the people.' Unless the Surgeon-General is unwilling to concede such a kind of democracy for India and is anxious to retain India in serfdom for all time, there is no meaning in asking doctors to keep aloof from politics. In our own Presidency, it was the late DR. T. M. NAIR, the first esteemed Editor of our journal, that was instrumental in introducing the Provincial Medical Council Bill in the old Legislative Council of Madras and getting it placed in the Statute Book, with all its defects and imperfections. Again, it was left to a medical man, DR. T. S. S. RAJAN, to remove all the inequalities and disabilities in the Medical Profession and make the Independent Medical Profession in Madras more stable and secure, during the brief period of his administration, as Minister of Medicine and Public Health. The Surgeon-General, evidently, wants to undo the good work of the Congress Ministry and revert to the old bureaucratic order of things, when medical men in service danced to the tune of the I. M. S. at the head and the Independent

Medical Profession were merely eking out a meagre livelihood out of the crumbs that were thrown out by the salaried medical men. The days are long past, when such a state of affairs would be permitted and, with due deference to the Surgeon-General, we would strongly advise medical men to enter politics in larger numbers and thus safeguard the interests of their profession in a democratic constitution which must eventually be established in India, in spite of the Surgeon-General and people of his ilk.

Secondly, the Surgeon-General is of opinion that the Honorary System, that was introduced by the late Congress Ministry, is a failure and that it should soon be replaced by paid men. As Chairman of the British Medical Association in this Presidency, he got the following resolution passed by that body, in response to a reference from Government on the working of the Hony. System, which reflects his own views on the subject:—

“That all House Surgeon posts should be paid posts in teaching as well as in non-teaching hospitals and that in teaching hospitals, the post of Clinical Assistantships should be reopened, so as to enable men who have completed their House Surgeoncies and who desire to take higher Degrees in Medicine, Surgery or specialised subjects, to get employment as Clinical Assistants. We recommended that these appointments should carry a stipend of Rs. 50/- a month, that the tenure of these appointments should be for two years, which would give ample time and opportunities for men to take higher qualifications and at the same time, help them to become professionally mature. It would be from the ranks of those who have held Clinical Assistantships that the Hony. Assistant Medical Officers in the future would be drawn. We have also recommended that the posts of Hony. Asst. Medl. Officers and Hony. Surgeons and Hony. Physicians be paid posts”.

Our readers might remember that the Honorary System was devised firstly to effect economies in expenditure under Salaries of Establishment, which is now top-heavy and out of all proportion to the financial means of this Province, and secondly, to give the Independent Medical Profession a greater scientific knowledge and wider clinical experience, so that after a service of five years or more, they may be better able to serve the public in their capacity as Private Practitioners. It is a notorious fact that, even after 150 years of British rule in India, Medical relief is poor—the majority of the population suffering and sometimes dying without any kind of medical attendance whatever. Establishments consume a large slice of the provision under ‘Hospitals’ in the Provincial budgets and there is hardly anything left for the poor patient by way of diet, medicines &c.

The reason for this is not far to seek. The poor tax-payers for whom our local contemporary, “*The Madras Mail*”, sheds tears, are

being saddled with a very costly cadre such as the I.M.S., for employment in the State Hospitals. The I.M.S. is essentially a Military Service and in days gone by, when sufficiently trained and qualified Indian medical men were not available, a few of the members of the I.M.S. were thrust in for Civil employment. This practice has no justification whatever now. We have, at present, in our own country and Province, a number of capable and well-qualified medical men occupying responsible places in the Medical Services paid or honorary and doing excellent work. The Governments, that have been at the helm of affairs, have had nothing but good words to say about their work. The old shibboleth that the European residents of this country were particular in getting themselves and their families treated only by European medical men is a thing of the past. It is a pleasant sight to see Europeans getting treated by capable Indians, and very often preferring them to others. It is high time, therefore, that the tax-payer is relieved of this enormous burden.

We want to make our position very clear. We have no objection and, in fact, we welcome the Clinical Assistants being paid Rs. 50/-. It is not as if this is all the labourer is worthy of. But, it is enough to enable a raw graduate to maintain himself in a costly city while getting more experience and training. The Surgeon-General evidently makes this generous offer to paint the Congress Government black. We would only remind the Surgeon-General that this is no more adequate than the glorious sum of Rs. 25 per month, which the old bureaucratic regime paid to Hospital Assistants, who, in the olden days, were posted to independent charge of dispensaries in mofussils and who were solely held responsible for the lives of the thousands of patients that came to them for treatment and on whose post-mortem examination and certificates, human beings were hanged.

The Surgeon-General added that he had every reason to believe that the Government of Madras, that is, the present Governor's Government, would act on those recommendations. Whoever doubts they will not? For, within the last one year, we have ample evidences before us to show that the reforms of the Congress Government have been modified. The hidden hand of influential persons have pulled the strings successfully and, one by one, the reforms made by the Congress Government are being altered or modified. First, we had the rule prohibiting private practice by Government doctors modified in a way that nullifies the original intention. For, who can define a family and who can say who is and who is not a member of one's family? We next had the five year rule, brought into force by the Congress Government, being modified to the extent that it was said to be applicable only to non-teaching institutions. Promotions and appointments to special posts were made not on the principle of seniority but on other considerations. We would not be surprised if the Honorary System, introduced years ago and modified by the Congress Government, is totally altered by the present Government to suit the ideas of its advisers. Lastly, comes the proposal to recruit

medical men for salaried posts, though such recruitment was stopped by the Congress Government in view of the expansion of the honorary scheme.

The Surgeon-General is of opinion that the hospitals are intended only for the poor and that the rich should go to private practitioners for treatment. Is the Surgeon-General satisfied that the rich do not get admitted into hospitals to the exclusion of the poor? Does not the Surgeon-General agree with us when we say that unless the private practitioners are equipped with the necessary scientific knowledge and clinical experience which, service in State hospitals alone can endow them with, it is futile to expect rich men to go to raw and inexperienced private practitioners for treatment? Will not the Surgeon-General agree with us when we say that the only way to fulfil this is to employ more Honoraries in State hospitals and train more men for the benefit of the rich public? We have no desire to starve the Honoraries but the wherewithal has to be found and will not the Surgeon-General agree with us when we say that this can only be done by reducing the fabulous salaries of paid men at the top and paying the Honoraries at the bottom adequately? Will the I.M.S. men accept a cut in their salaries to pay the Honoraries? Echo answers—will they?

GLEANINGS FROM MEDICAL PRESS

Pediatrics

Pediatric Emergencies.—JOSEPH BRENNEMANN, in an article on this subject in the *Jour. A.M.A.*, March 16th, 1940, says that relatively few of them require medicinal treatment. When they do, however, the indications are nearly always simple, single, and mandatory, and the results are favourable.

Newborn Period:—The newborn infant presents emergencies that are unique. Asphyxia of any degree calls for respiratory stimulation. In the mildest cases flicking cold water or ether on the chest is often all that is necessary. In all the more serious cases the methods of choice, and the most effective, are the use of Carbon Dioxide inhalation and the Drinker respirator. YANDELL HENDERSON gives the following directions: "The Carbon Dioxide required for the initial resuscitation should be of whatever strength is needed to induce respiration, but after respiration is started 7 per cent or even 5 per cent. is generally sufficient.

...In premature or otherwise weak babies...the inhalation of 5 or 6 per cent. Carbon Dioxide should be repeated several times during the first few days". If these resources are not available some gentle form of artificial respiration must be employed.

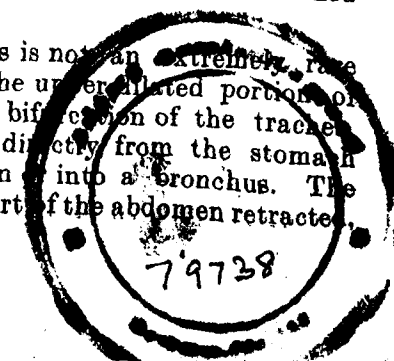
Intracranial hæmorrhage due to injury at birth, even if it is of clinical significance, offers serious difficulties both as to diagnosis and

as to its relationship to asphyxia in a given case. If there has been a difficult and prolonged or a precipitous labour, if the anterior fontanelle is tense and full, if there are convulsive seizures, especially if unilateral together with coma, one may assume that this is due to a hæmorrhage. If such conditions are not present it is commonly impossible at this time to differentiate a birth injury from a developmental anomaly of the brain. Lumbar puncture probably does no good and from the very nature of the procedure may do harm by increasing intracranial pressure at the time and so inducing more bleeding. If the fontanelle is very tense and coma persists, the intravenous injection of from 20 to 50 cc. of 20 per cent. Dextrose may be of value. Since rest, as nearly absolute as possible, with the use of sedatives if necessary, is the one imperative indication, it is obvious that no disturbing procedure should be employed unless it is clearly indicated. Gavage is necessary after a time if food is not taken naturally.

Hæmorrhagic disease of the newborn is one of the dramatic emergencies of this period. About the third day of life the baby begins to bleed from multiple sources—mouth, nose, bowels, vagina, subcutaneous tissues, body cavities, internal organs, and even into the brain. Bleeding from the bowel and a slight oozing from the vagina, when this occurs alone, has a different cause and is of little significance. Injection of 20 c.c. of human blood, usually from the father, 10 c.c. in each buttock followed on the next day by an equal or greater amount of blood serum if the bleeding has not been arrested, has reduced a former mortality of nearly 100 per cent. to one that approaches zero. The disease is apparently on the wane, and may have something to do with the mother's diet.

Tetany, or hypocalcæmia, of the newborn has attracted increasing attention in recent years. The symptoms are much like those of tetany of a later period, with convulsions as the outstanding and most alarming symptom. Chvostek's sign is usually positive but often occurs in the normal newborn infant. The blood calcium is far below the normal 9 to 10 mg. per hundred cubic centimetres of blood. If there is no other obvious cause for the convulsions, treatment should be begun at once without waiting for a calcium determination. In milder cases calcium chloride or calcium gluconate may be given by mouth. In more serious cases 10 cc. of a 10 per cent. solution of calcium gluconate should be given intravenously or intramuscularly. To this may be added 20 units of solution of parathyroid subcutaneously. Calcium chloride by mouth may be continued for a time, if necessary, until a sufficient amount of calcium has been obtained from milk in the infant's food.

Congenital atresia of the œsophagus is not an extremely rare condition. In nearly all reported cases the upper dilated portion of the œsophagus ends blindly at about the bifurcation of the trachea and the lower attenuated portion passes directly from the stomach into the trachea at or near the bifurcation into a bronchus. The stomach is usually distended, the lower part of the abdomen retracted.



Saliva runs from the dependent corner of the mouth, and after taking more than two swallows of water the infant chokes, water gushes from his mouth and nose, he becomes profoundly cyanotic and death seems imminent. The diagnosis may be confirmed by X-ray examination after a small amount of Barium Sulphate is given by mouth or by finding that a catheter passed into the œsophagus ends at about 12 cm. from the alveolar border of the mouth. Gastrostomy, with and without preliminary tying off of the gastric end of the œsophagus, and jejunostomy have been tried. No child has ever lived, and with the consent of the parents one is justified in letting the child die without treatment. Death follows around the end of the first week of life from bronchopneumonia and starvation.

Gastro-intestinal Tract:—Appendicitis presents a true emergency in the first day or two or even three. If uncomplicated, the fever is usually low, the pain not intense, the white blood count moderately high, and vomiting nearly always occurs early. Point tenderness, more marked and more significant than unelicited pain, occurring most often at or below McBurney's point but also anywhere from the flank to the pelvis and, rarely, even to the left of the left rectus muscle, is the single most important sign in the early stages. In this early period there is usually a voluntary protective contraction of the muscles; involuntary boardlike rigidity indicates peritoneal involvement. Operation is usually clearly indicated in the first two or even three days and at any time if there is spreading peritonitis. If the patient is seen on the third or fourth day and there is an evident tendency for the inflammatory process to become walled off, it is safer to await the disappearance of the mass and to operate a month or two later. In an instance of acute so-called primary peritonitis, nonappendical in origin and due to a pneumococcus or a streptococcus, is it usually better not to operate until localization has taken place. Sulphanilamide or Sulphapyridine is indicated, depending on whether the cause is a hæmolytic streptococcus or a pneumococcus.

Acute intestinal obstructions are relatively frequent in childhood. In the newborn there may be congenital absence or narrowing of a portion of the intestine, more often in the distal ileum, leading to great distress, distention of the abdomen, uncontrollable biliary vomiting and absence of meconium and fæces. Surgery is indicated but offers little as a rule. The commonest type of intestinal obstruction is intussusception, usually at the ileo-cecal junction and predominantly in the first year of life. The onset is uniquely sudden, so that the exact hour of its occurrence is nearly always stated. The child begins abruptly to scream with intense, intermittent colicky pain, soon followed by vomiting and a varying degree of shock. After a time the pain becomes less severe; he no longer screams or even cries, but with each return of the pain he winces or sighs, draws up his legs or turns over in bed. He no longer smiles, and there is a distant, abstracted, serious, resigned, apprehensive expression that may be misleading but is actually of diagnostic value. Cardinal signs in addition to those mentioned are a slightly tender, sausage-shaped

mass, usually in the transverse or descending colon, occasionally in the rectum or even appearing externally, and blood in the stools, though not always in the first one. After this there may be some fæces, but there is characteristically an intimate mixture of blood and mucus—rarely only thick, white, glairy mucus. The blood is never copious and never clots, unless there is also a bleeding Meckel's diverticulum (to be discussed later). Of practically pathognomonic significance is a silent spurt of a small amount of a turbid currant jelly-like mixture of blood and mucus which follows the retreating finger after a digital examination. An early intussusception may occasionally be reduced by injecting air or Barium Sulphate and making gentle pressure under the fluoroscope. Valuable time, however, should not be lost before resorting to surgery, as the condition is a real emergency. Similar obstructions with like indications for treatment occur with volvulus bands, post-operative adhesions and Meckel's diverticulum. There is usually no definite mass, and there is no blood in the stools; however, both these conditions may occur if Meckel's diverticulum is the starting point of an intussusception.

A hernia, commonly inguinal, may become incarcerated or strangulated. An incarcerated hernia can often be reduced in infants and young children by suspending the body by the feet so that the hips are elevated some distance above the bed. If reduction does not take place after a reasonable time, operation is indicated. Strangulated hernia usually presents more serious symptoms and more urgent indications for treatment. There is persistent vomiting, pain, tenderness, and often shock. Reduction is no longer possible without operation.

Hæmorrhage from the bowels is always an arresting symptom and a potential emergency condition. While slight hæmorrhages, commonly of obvious causation, occur with papilloma, foreign body, dysentery, intussusception, scurvy, Henoch's purpura and blood dyscrasias, and larger ones with gastric or duodenal ulcers characterized by tarry stools, a copious bright red hæmorrhage should always lead one to suspect a bleeding Meckel's diverticulum. The diagnosis is almost certain if the blood clots and is at times bright red and at others darker in colour. The bleeding is due to ulceration of so-called misplaced gastric mucosa in the wall of the diverticulum. Rarely, but ominously, the extent of the hæmorrhage may not be obvious if only part of the blood is passed. Sudden pallor and marked evidence of secondary anæmia should lead to investigation. The hæmorrhage commonly ceases spontaneously, but if it persists it is fairly free, and if the diagnosis seems justified the diverticulum should be removed. Perforation of the ulcer, with or without hæmorrhage and simulating appendicitis, may occur and even more clearly calls for surgical intervention. Recent observations have shown that a like clinical picture can be produced by papillomas in the colon (demonstrable by X-ray examination).

Foreign bodies in the pharynx may present alarming symptoms, and removal may require skilled assistance. The usual attempt to remove the body with the finger should be avoided except in extreme

emergency. If lodged in the œsophagus, usually in the upper part, the symptoms may be restricted to discomfort and difficulty in swallowing. Early removal is imperative for fear of rupture into the mediastinum and the pleural cavity, which carries a very high mortality. As a rule, a foreign body that has passed into the stomach will escape through the pylorus and cause no harm in the intestinal tract. Long or peculiarly shaped bodies such as a hairpin or a "bobby pin" may not be able to pass the windings of the duodenum and should be removed from the stomach by an endoscopist, if available; if not, by a surgeon. The X-ray examination is of great value throughout if the foreign body is radiopaque.

Respiratory Tract:—Foreign bodies in the respiratory tract are a common cause of emergency in childhood. In the larynx they may lead to alarming obstruction to breathing. There is usually an inspiratory stridor, hoarseness and a croupy cough that may simulate membranous croup. A pedunculated papilloma of the larynx caught between the vocal cords may produce the same symptoms. There is however, usually a history of preceding stridor and hoarseness of long standing. In the trachea, if the foreign body is large enough, both main bronchi may be obstructed, resulting in death. If there is only partial obstruction of the trachea or of one main bronchus, there will be an expiratory wheeze that may easily be mistaken for asthma. If the partial obstruction of the bronchus is of the right degree there will be, in addition to the wheeze, an obstructive emphysema on the affected side with possibly eventual respiratory silence and both exaggerated breathing on and displacement of the heart to the opposite side. If the bronchial obstruction is complete, the characteristic signs on the affected side are dullness, absence of breath sounds or bronchial breathing and bronchophony, with exaggerated breathing on the opposite and displacement of the heart toward the affected side. A roentgenogram is obviously of great confirmatory help in diagnosis whether the body is radiopaque or not. Bronchoscopic removal of the foreign body is indicated at the earliest possible time: imperatively so if it is of vegetable origin, because of the known serious irritation produced by such substances. Three things may well be stressed: the suspiciousness of a wheeze, the fact that a large percentage of foreign bodies are peanuts, and the fact, while a foreign body in the respiratory tract is always ushered in by sudden choking, commonly with cyanosis, the latter is no longer present if the body becomes fixed.

Empyema is a condition calling for immediate action only when there is profound impairment of vital capacity and great displacement of the heart and large vessels. Repeated aspiration or closed drainage with gradual removal of pus is then indicated. A tension pneumothorax, nearly always a pynopneumothorax following rupture of an empyema into a bronchus, with a valvelike mechanism permitting freer entrance than exit of air, commonly presents an urgent condition. There is a tympanic percussion note, sometimes hard to elicit, shifting dullness and absence of breath sounds on the affected

side, together with exaggerated breath sounds on and displacement of the heart toward the opposite side. A succussion sound, if present, is pathognomonic. Aspiration is futile. Drainage is indicated usually by the closed gradual method, though replacing tension by a simple pneumothorax through open operation would seem a safe procedure if the air is not allowed to escape too freely for a time.

The croup family, all characterized by laryngeal obstruction, requires careful differentiation, since some of the members are urgently alarming and others only apparently so. Excluding those caused by congenital anomalies, foreign bodies and papillomas, they are all due to inflammation and in varying degree to spasm of the larynx. Spasmodic croup usually is easily recognized, especially if there have been previous attacks and if there is a familial tendency. A young child beyond the period of infancy who has seemed well during the daytime, or has at most a slight respiratory infection, after going to bed at night quite suddenly wakes up with a croupy, barky, brassy, sepulchral cough that is soon followed by loud stridulous breathing, profound respiratory obstruction and great restlessness. The condition seems truly alarming to the uninitiated but is usually quite readily relieved in a warm room by inhalation of steam from a croup kettle or some similar device. The ancient remedy of a teaspoonful of syrup of Ipecac is effective but messy and distressing. There may be another attack the following night, but usually there is not.

Catarrhal laryngitis is a simple inflammation of the larynx as part of an infection of the respiratory tract, and is characterized by hoarseness, croupy painful cough, inspiratory stridor and fever. Spasm is absent or minimal. The onset is not explosively sudden nor restricted as to time, and the symptoms persist for from several to many days without interruption. The condition is rarely serious, and can be ameliorated by having the child kept in a warm room more or less saturated with moisture from a croup kettle or a pan of boiling water. It must be differentiated from membranous croup or laryngeal diphtheria, often not an easy matter at the onset.

Membranous croup is usually less febrile and more insidious in onset but more constantly and definitely progressive. The cough is usually more brassy and tight and the stridor more sharp than in simple laryngitis. As the disease progresses there is profound dyspnoea, a loud rasping stridor, retraction of the suprasternal notch and the lower end of the sternum, deep cyanosis and great restlessness. The initial hoarseness descends to a whisper and finally to a complete loss of voice such as rarely occurs with a simple catarrhal laryngitis. As the end approaches, the cyanosis gives way to an ashen grey colour and the child ceases to struggle. If there is a membrane in the throat or competent laryngeal observation is available, the diagnosis can usually be made early. A culture of material taken from the larynx may reveal the true nature of the disease, but is not dependable, and the result should never be awaited before treatment is begun in a suggestive case. From 20,000 to 40,000 units of antitoxin should be given at once and the result from the culture used as a

guide to further treatment. If the dyspnoea becomes alarming, as shown by a great restlessness, increasing cyanosis and retraction, treatment by suction, intubation or tracheotomy is urgently indicated. Environmental factors will necessarily determine the method of choice in a given case.

Laryngotracheitis, if it can be distinguished except by the course from the more serious condition about to be discussed usually can be relieved by palliative measures. True laryngotracheo-bronchitis, involving the bronchi as well as the trachea and larynx, is as serious as membranous croup, if not more so, since there is no specific anti-toxin and the course is more prolonged, complicated and exhausting. There is sometimes supraglottic and always laryngeal and subglottic obstructive oedema, together with a characteristic involvement of the trachea and bronchi, that leads to the formation of thick, tenacious, gummy, ropy secretions that block the air passages. There are thus in a high degree essentially the symptoms and signs of other forms of croup plus those already described as occurring with foreign bodies in the larynx, trachea, and bronchi, together with obstructive subglottic and more rarely supraglottic oedema. The indications for treatment are to keep the airways clear. In milder cases bronchoscopic suction and intubation may be successful under favourable conditions. In severer cases presenting marked supraglottic and subglottic oedema and bronchial obstruction, tracheotomy is imperative. It alone relieves obstructive supraglottic oedema and permits as nothing else does the safe removal of the offending secretions by suction with a catheter or by bronchoscopic aspiration. Retention in a warm room saturated with moisture, not too hot, expert nursing and bronchoscopic and medical teamwork are essential to success in meeting the ominous obstructive conditions that often appear with startling suddenness.

Genito-Urinary Tract.—Uræmia or cerebral oedema occurring with nephritis, as manifested by headache, dizziness, somnolence, hypertension, and eventually coma and convulsions, calls for prompt relief by intravenous injection of 25 per cent. Dextrose, 0.5 per cent. Magnesium Sulphate or intramuscular injection of from 2 to 4 cc. of 50 per cent. Magnesium Sulphate at four hour intervals until the blood pressure reaches a safe level. A single, harmless but marked urinary retention of unknown ætiology occasionally occurs in childhood. Extreme retention may occur as a result of painful urination due to ulceration of the meatus from the "ammoniacal diaper." Immediate relief follows a drop of 5 per cent. Cocaine Hydrochloride solution on the ulcer. Repetition is avoided by wet Boric Acid dressings, or the application of Petrolatum and attention to the ammoniacal diaper. The latter is carried out by thoroughly washing, rinsing, and boiling all diapers and soaking and drying those which are to be used at night in a saturated solution of Boric Acid.

Torsion of the testicle, or rather of the cord, is a rare but serious condition. There is sudden, exquisite pain and swelling of the testicle, nausea and vomiting, and often shock. Necrotic gangrene quickly supervenes with relief of subjective symptoms. Immediate operation

must be performed if the testicle is to be saved. CAMPBELL states that removal of the testicle is indicated in 90 per cent. of the cases. Spontaneous or therapeutic untwisting of the cord may take place rarely, but even then atrophy is likely to result.

Rupture of a kidney due to a blow or a crushing injury, leading to hæmaturia and local pain, tenderness and possibly swelling, is nearly always best treated expectantly.

Central Nervous System:—A convulsion in an infant or a young child occurring at the beginning of a febrile disease or, more rarely, even later in the course of the disease, if the temperature rises rapidly from a low to an adequately high point, has usually the same significance as a chill in an adult, and is of relatively little greater importance. It commonly ends spontaneously. If it does not and, especially if there is hyperpyrexia, a tepid, cool or even cold pack is indicated until the fever is reduced to a safe point. Only one thickness or at most two thicknesses of sheet should be used, so that the cooling effect of evaporation may also be called into play. The same procedure will prevent an impending convulsion. Two grains (0.13 Gm.) of Acetyl Salicylic Acid for each year of age, best given in orange or some other heavy syrup, may have the same effect. The use of the conventional hot bath has probably survived only because the convulsion ends in spite of the treatment. If the convulsion still persists it must be controlled even if anæsthesia by means of Chloroform or Avertin with Amylene Hydrate is necessary. Convulsions occurring periodically during later infancy may be due to tetany and require antirachitic treatment. Occurring periodically at a later period without fever usually means idiopathic epilepsy, although organic disease of the brain must be excluded.

Concussion of the brain, with or without loss of consciousness, is characteristically accompanied by pallor, somnolence and nausea or vomiting. Since organic injury such as hæmorrhage has probably taken place, rest is imperative. This is especially indicated if there is a skull fracture, as shown in the roentgenogram, by bleeding from the nose, mouth, ears or into the post-orbital space, or by leakage of spinal fluid. Coma and convulsions or localized twitchings, probably due to hæmorrhage, are not infrequent. The present tendency is to avoid spinal puncture for either diagnostic or therapeutic purposes. Rest in bed with restraints for the younger child and elevation of the head of the bed should be enforced for a period of several weeks. The temperature, pulse, respiration and blood pressure should be carefully watched for a time. If coma and hypertension persist, the treatment described for cerebral oedema, or even surgical intervention, may be indicated, the latter especially if there are focal signs. Surgery is usually restricted to cases in which there is obvious or well founded suspicion of a depressed fracture. X-ray examination may show a depression restricted to the inner plate of the skull.

Metabolic Disturbances:—Acidosis occurs as a symptom of many conditions, notably in diabetic coma and in alimentary or intestinal

intoxications in infancy following great loss of body fluids and overdosage with salicylates or acetylsalicylic acid. The one dependable clinical symptom is hyperpnoea or deep breathing, which may early be of normal rate but in more advanced conditions is deep, rapid and pauseless. The urine shows the presence of acetone and diacetic acid, and in diabetic coma there is glycosuria and hyperglycaemia. Treatment is urgent. In all cases replacement of body fluids is indicated. In non-diabetic acidosis this should be done by intravenous injection of Dextrose and physiologic solution of Sodium Chloride, or preferably lactate Ringer's solution. In diabetic coma the intravenous administration of Ringer's or lactate Ringer's solution and the intramuscular injection of insulin are urgently indicated. The volume of fluid should be from 20 to 30 cc. per kilogram of body weight and should not be injected faster than 5 cc. a minute. The insulin requirement during acidosis is not less than 1.5 units per kilogram of body weight plus 1 unit for each gram of sugar administered, usually dextrose in 5 per cent solution.

Increasing interest has recently been directed to hypoglycaemia. The hypoglycaemia of hyper-insulinism is a familiar example. It may, however, occur with startling suddenness and seriousness in adequate intake of carbohydrate, liver damage and under still other conditions the nature of which requires further observation for clarification. The symptoms vary from irritability, lassitude, and somnolence to convulsions and coma. The treatment consists in the prompt administration of orange juice or sugar to restore the blood sugar concentration to normal. If oral administration is impossible or ineffectual, or if the condition is alarming, from 10 to 25 per cent. Dextrose solution should be given intravenously. The patient is commonly restored to normal while the injection is being given.

Allergy is widespread, and in the markedly hypersensitive individual the injection of a foreign protein such as horse serum may lead to anaphylactic shock and death. Before antitoxin is given the best for sensitivity of the skin should be performed. If positive, the procedure of desensitization should precede the administration of the full dose of serum and the latter should contain an adequate amount of Epinephrine. A hypodermic loaded with this drug should be a part of the equipment whenever serum is given.

In acute poisoning the stomach should be washed out thoroughly unless the agent is an escharotic. If the latter is an acid, an alkaline solution should be given; if an alkali, an acid solution such as diluted vinegar, is given. Information as to antidotes and specific methods of treatment of all other forms of poisoning should be constantly and immediately accessible to every physician.—*The General Practitioner*.

Stomatitis in Childhood.—Among 115 children suffering from stomatitis PARSONS found that it was not always possible to classify the cases into general types: aphthous, catarrhal, mycotic or thrush, ulcerative, gangrenous or noma and symptomatic stomatitis. Generally the clinical and bacteriologic features of the stomatitis of

children less than 2 years of age differed from that of older children. Sixty-seven of the 115 children were girls. The youngest patient was 13 days old and the oldest 11 years. More than half of the cases occurred in children less than 2 years of age and four fifths before the third birthday. The incidence of the disease diminished progressively as age increased. The most common symptoms were sore mouth, anorexia and malaise. Diarrhoea was common in children of the young group, constipation in the older children. Vomiting was frequent in all. Pyrexia was considerably higher in the older group. Toxic, grayish pallor without obvious anaemia was an exceedingly common symptom. Stomatitis occurred in the young artificially fed children or those who sucked dummies. It was usually due to thrush, even when aphthous ulceration was the chief sign. There was little or no odour, and the cervical glands were not involved. Gastro-enteritis was an extremely serious complication. There was no distinct division between this type of stomatitis and the one occurring in older children. The stomatitis of older children was of the Vincent type but was often complicated by aphthous ulceration, while inflammation, offensive odour and glandular enlargement were the rule. The organisms concerned were anaerobes, but an underlying organism of unknown character, possibly a virus, was probably the cause, and aphthous ulceration merely a symptom. An absolute and relative monocytosis was found in many cases of stomatitis in all age groups. It was quite characteristic but the reason for its occurrence is unknown. Various forms of treatment were tried but local application of either 1 per cent aqueous solution of Gentian Violet or Tincture of Merthiolate was most effective. Symptomatic relief was particularly rapid. There was no evidence to implicate vitamin deficiency.—*J. A. M. A.*

Medicine and Therapeutics

Diseases of the Gastro-intestinal Tract, Liver and Peritoneum.

—Vitamin B and Liver Extract in the Treatment of Non-specific Chronic Diarrhoea and Colitis. G. Cheney, *Am. J. Digest. Dis.* 6: 161 (May) 1939.

Thirty-two persons suffering from nonspecific chronic diarrhoea and colitis were treated with vitamin B₁, with liver extract or with both vitamin B₁ and liver extract. From this study the following conclusions were arrived at:

1. Patients with chronic diarrhoea of unknown cause may respond almost specifically to the administration of vitamin B₁. Most of them will improve on oral therapy alone, but some may require treatment by injection.

2. A number of patients suffering from constipation predominantly of the atonic type, occasional short bouts of diarrhoea, mucus in the stools and varying degrees of abdominal distress, gas and general exhaustion (mucous colitis) respond favourably to treatment with vitamin B₁. The majority of these patients require to be treated

parenterally, but some will show improvement on oral therapy alone.

3. The majority of patients with idiopathic ulcerative colitis will have a remission during the first month of treatment with concentrated liver extract, administered parenterally. This is borne out by the improvement which occurred in 18 of 19 persons so treated. The improvement is not only symptomatic; the characteristic ulcerations of the bowel tend to heal.

4. The 32 patients with chronic diarrhoea and colitis who were treated with vitamin B₁ and with liver extract were ordinarily not cured, as exacerbations usually occurred after the treatment was stopped.

5. The effectiveness of liver extract in the treatment of ulcerative colitis is apparently not due to vitamin B₁ or to vitamin B₂ but to some as yet unidentified substance contained in the extract. It seems probable that this substance improves the resistance of the colon to infection. Morrison, Savannah, Ga.—A. J. D. C.

Surgery

Differential Diagnosis of Strangulated Inguinal Hernia.—Basil Hume (*Lancet*, Dec. 23, 1939) questions why if the diagnosis could be made easily there should be a case mortality of 20-37%, even allowing for the highly toxic character of the bowel exudate. The most important features are the three major symptoms of pain, vomiting, and inability to pass flatus, in conjunction with the absence of abdominal tenderness or of rigidity or of both. Their absence is a most important point in differential diagnosis, for in other acute abdominal emergencies both of them are present.

There are, however, four problems that must be considered in the differential diagnosis.

(1) Are the symptoms, which we assume to be those of acute intestinal obstruction, caused by the hernia? In other words, is the hernia strangulated or merely irreducible? An irreducible hernia does not cause any abdominal pain other than a dragging sensation. It is soft and painful on pressure, whereas the strangulated hernia is tense and tender. If the hernia is associated with acute intestinal obstruction from some other cause, it will have an impulse on coughing and probably be partially reducible.

(2) Is the case really one of hernia? The methods of diagnosis of a hernia have already been discussed, but three conditions should be remembered: torsion of an undescended testes, acute hydrocele in an infant, and acute appendicitis in a hernial sac.

Torsion of an undescended testis:—The following case is given as an example:—

A medical man aged 27, had a small right inguinal hernia for

years, but it had only occasionally become complete. He was seized after breakfast with a violent pain in the centre of the abdomen, associated with shock and vomiting. In his right inguinal region was a tense and tender swelling, but the emptiness of the right side of the scrotum, the cessation of the vomiting, and the passage of flatus made the diagnosis clear.

Acute hydrocele in an infant:—No one can have been in either general or surgical practice long without having been called by an anxious mother to see her infant, who is having colicky abdominal pains and in whom a scrotal swelling has appeared. You are able to "get above" the hydrocele, and the child, although in pain and possibly vomiting, can pass faeces and flatus naturally.

Acute appendicitis in a hernial sac:—In this case there will be pain and the tenderness over the lump, but the symptoms will be those of appendicitis, and not of acute intestinal obstruction.

(3) May we be dealing with two conditions—namely, strangulated hernia and acute peritonitis from some other cause?

A colleague removed a gangrenous non-perforated appendix from a lady, the abdomen being closed without drainage. Four days later, influenza having overtaken my friend, I saw the patient, in whom the doctor in charge had diagnosed paralytic ileus, for she had pain, was vomiting, and had not passed flatus. The pain appeared to me to be more than I should have expected with that condition and vomiting was frequent.

Careful examination revealed a small left femoral hernia, which was tense and tender, and an auscultation of the abdomen increased intestinal sounds were heard. The latter alone would exclude ileus, the only alternative diagnosis being a mechanical obstruction by kinking or adhesions. The tense and tender nature of the hernia showed that it was strangulated.

The following case also illustrates how a loop of bowel can be forced into a hernial sac and become strangulated when associated with the increase of intraabdominal pressure that accompanies acute distension of the intestine.

A woman, aged 70, was admitted with a typical attack of acute cholecystitis, and a large and tender gall-bladder could be palpated. The patient began to vomit twenty-four hours later, and on examination a tense and tender swelling was found in the groin. Two enemas produced no result, and a correct diagnosis was made.

(4) Is it a strangulated partial enterocoele? In a true partial enterocoele (Richter's hernia) and in herniation of Mecker's diverticulum (Litter's hernia) the lumen of the bowel is not obstructed, unless in Richter's hernia more than half the circumference is involved, when the bowel becomes kinked. In all other instances faeces and flatus would be passed. The initial pain may be severe but colic is commonly mild, and vomiting is neither severe nor persistent, especially since the terminal ileum is nearly always the site in either. The

patient often does not consider the symptoms sufficiently severe to seek advice until the really grave event of perforation of the line of constriction into the paritoneal cavity. These herniæ are small and nearly always femoral, hence they may be overlooked.

In all cases, unless the diagnosis can be made at a fairly early stage, the patient may be doomed. He will succumb to the toxæmia of the strangulation or to peritonitis resulting from perforation. The use of morphia is as dangerous in strangulation as in other acute abdominal emergencies and is more useless. Atropine is more effective than any other drug in relieving the severity of colic.—*The General Practitioner.*

Ophthalmology

The Treatment of Conjunctivitis.—In infective conjunctivitis prophylaxis is of the utmost importance, for the protection of contacts and the prevention of infection spreading to the good eye in the unilateral type. Scrupulous care must be taken of cotton-wool, handkerchiefs, towels, and the hands, and the good eye should be protected by a Bullar's shield. These facts are pointed out by B. R. Medlycott (*Medical Press and Circular*, February 21, 1940, 203, 155). Irrigation should be instituted directly infection is suspected, the most effective method being by means of an undine or, failing this, pledgets of cotton-wool soaked in the solution. Bland lotions are the best, such as normal saline (0.9 per cent. NaCl), 1.4 per cent. NaCl, Boracic Acid 8 grains to 1 ounce, or sodium bicarbonate 10 grains to 1 ounce. Useful antiseptic solutions are Mercury Oxycyanide (1 in 10,000) and Mercury Perchloride (1 in 10,000). The patient should be in the recumbent position, with a mackintosh under the head and a kidney dish held to the cheek. Adherent discharge is removed with moist swabs. Bandaging is contraindicated as the irritating discharge injures the corneal epithelium and bacterial growth is increased by warmth. Treatment should be carried out three times daily in mild cases and at one to two-hourly intervals in severe gonococcal ophthalmia. Silver nitrate in the form of drops is not used except in a 1 per cent. solution for the treatment of ophthalmia neonatorum, but painting of the lids with a 2 per cent. solution shortens the course of the disease if done in the early acute stage. Anæsthesia of the nerve-endings is procured by the application of Cocaine Hydrochloride drops, 2 per cent. then a wisp of cotton-wool with a free tail is wrapped round a smooth glass rod, the wool is dipped in the solution and drawn across the mucous membrane of the everted lid, care being taken to avoid excess of fluid reaching the cornea. The eye is then irrigated with saline. Frequent application of Silver Nitrate is contraindicated except in chronic cases, but eye-drops of Argyrol, 10—20 per cent. or Protargol, 10 per cent., can be employed after irrigation in the early stage. This treatment must not be continued for more than one month. For the prevention of adherence of discharge to the lids and eyelashes soft yellow Paraffin, either alone or combined with

Boracic Acid 30 grains to 1 ounce, is useful, and relief of the œdema can be obtained by application of ice-cold swabs. Dark glasses add to the patient's comfort if photophobia or blepharospasm are present. During the stage of resolution Zinc Sulphate or Zinc Chloride drops (1 grain to 1 ounce), twice or thrice daily, can be used and the conjunctiva can be massaged at bedtime with an ointment such as:—

Ichthyol	... 8 grains
Zinc Oxide	... 4 „
Soft yellow Paraffin	... 1 ounce

After the acute stage has passed irrigation is reduced to two or three times daily and an astringent lotion can be employed, such as Lotio Aluminis (Alum Purificatum, 4—6 grains to 1 ounce.)—*The Practitioner.*

PROCEEDINGS OF SOCIETIES, ASSOCIATIONS, ETC.

The Krishna District Medical Association, Masulipatam.

(The Krishna District Branch of the Indian Medical Association.)

The Minutes of the 16th monthly meeting held on Saturday the 24th August 1940 at 4-30 P. M. :—

The meeting began with Dr. K. Venugopul Rao Naidu, L.M.S., Asst. District Medical Officer, in charge, Kistna and President of the Association, in the chair.

The President demonstrated a case of Choroiditis. Dr. C. Subbarao, M.B.B.S., read an interesting case of Teratoma of the Ovary.

Dr. M. Venkata Subbarao, read case-notes on the following:—(1) Tuberculosis of the Tubes with Extensive Metastasis in the Pelvic Organs. (2) A case of Ectopic Gestation. (3) Congenital Hernia. (4) A case of Fracture of the Skull Frontal Region with protrusion of the Brain.

Dr. A. Narayana Rao, M.B.B.S., Medical Officer, Govt. Hospital, Gudivada, demonstrated a case of Migrating Periostitis of the Tibia after an attack of Enteric. Dr. S. Sreeramarao read a very interesting paper on "Influence of Psychic factor in Therapeutics."

The meeting came to a close at 8 P. M.

BOOK REVIEWS

Leprosy—By Sir Leonard Rogers, K.C.S.I., C.I.E., M.D., F.R.C.P., F.R.C.S., F.R.S., I.M.S. (Retd.), and E. Muir, C.I.E., M.D., F.R.C.S. 1940, 2nd Edition. Bristol: John Wright & Sons, Ltd. (Price: 15 sh.)

No one is more fitted to write a book on Leprosy than these two authors and one, therefore, feels it difficult to review a book written by these two world-famous specialists. The book bears the stamp of class all over it. The first edition that appeared fifteen years ago, was well reviewed. Since then, there has been a lot of progress in our

knowledge of leprosy. In this book, the first section deals with History and Distribution. The second, with Epidemiology and Communicability; the third, with Prophylaxis; the fourth with Aetiology; the fifth with Clinical Notes and the sixth, with Treatment. The former reliance on life-long compulsory isolation in prophylaxis has been modified, and the old prison-like asylums have given place to colonies. The Appendix deals with subjects such as the preparation of Esters and tests. A number of photo plates are included in the end and a few maps and illustrations are interspersed in the text. The book is neatly printed and well got up. It is undoubtedly one of the best books on the subject.

Green's Manual of Pathology—Revised and Enlarged By H. W. C. Vines, M.A., M.D. pp. 1166+viii. 701 Illustrations. 16th Edition. Bailliere, Tindall and Cox, London, W. C. 2. [Price: sh. 31/6.

The book before us is the sixteenth edition of Green's well known text book of Pathology. As in previous editions, the book is divided into two parts. The first part deals with general principles of Pathology and the second deals with special Pathology of organs in relation to clinical medicine. But there has been a considerable rearrangement of the text and much of it has been re-written. The chapters on pure Bacteriology and Parasitology have been omitted. New chapters have been written dealing with the process of repair of tissues and with general characters of tumours. A new chapter on diseases of the Reticulo-Endothelial System has been added. The book is very well got up and is profusely illustrated. It maintains the same standard of excellence of its predecessors and we have no doubt whatever that it will continue to be one of the standard text books of Pathology. We recommend it to all students of Pathology.

Pathological Histology—By R. F. Ogilvie, M.D., F.R.C.P. (EDIN.), Foreword by A. Murry Drennan, M.D., F.R.C.P. (EDIN.) with 220 Photo-micrographs in colour by T. C. Dodds, F.R.P.S., F.I.B.P., 1940, pp. 332. Edinburgh: E. & S. Livingstone. Indian Publishers: Messrs Butterworth & Co., Ltd., Bombay.

[Price: Rs. 18/8.

This book has been written to meet the needs of students of Morbid Histology and is meant to be a companion to the standard text books of Pathology. Its text is based on a series of lectures in Pathological Histology delivered at Edinburgh University and gives an account of the tissue changes produced by most common diseases. The earlier chapters deal with the phenomenon of degeneration, inflammation repair and tumours, vascular disturbances, while the later chapters are devoted to special diseases of the systems. Each microscopical description is introduced by a macroscopical account of the diseased tissue and organ. In some instances, brief notes on the aetiology of the conditions are also given. These certainly enhance

the value of the book. The book is very well got up, printed on good art paper and has nearly 220 photo-micrographs in colour, which give a realistic impression of what the microscope reveals in stained preparations. We congratulate Dr. Ogilvie in producing a book that so vividly represents and so ably interprets the original. We wholeheartedly recommend the book to our readers.

Handbook of Diseases of Infants and Children for Students and Practitioners—By F. M. B. Allen M.D., F.R.C.P. (LOND.) Second Edition, 1939. Bailliere, Tindall and Cox, London, W.C. 2.

No one will deny the fact that increasing recognition is being given to a study of Diseases of Children. It will be more helpful therefore, if examining and teaching bodies emphasise the importance of a study of Diseases of Children by more attention being paid to it in the curriculum. The present book is the second edition. It is certainly an improvement on the first. Here, the chapter on Infant Feeding has been re-written and those on the New Born and the Premature have been revised. New chapters on Diabetes and Obesity have been included. At the end is a useful Appendix dealing with the common infant feeds, proprietary foods and their composition, anti-pyretic methods, diagnostic methods, various tables, and a few prescriptions. A number of plates and diagrams have been inserted to illustrate the text. The book, on the whole, has been improved and made very useful.

Benign Lymphocytic Meningitis (Acute Aseptic Meningitis)—By Rustom Jal Vakil, M.D. (LOND.), M.R.C.P. (LOND.), D.T.M. & H. (LOND.), F.R.F.P.S.G. Hon. Asst. Physician, J. J. Hospital, and Tutor, Grant Medical College, Bombay. Foreword by Lt. Col. S. L. Bhatia, M.C., M.S., M.D., (CANTAB.), F.R.C.P. (LOND.), F.R.S.E., I.M.S., Principal, Grant Medical College. 94 pages. The Popular Book Depot, Grant Road, Bombay.

In this short treatise, Dr. R. J. Vakil has collected a great deal of information regarding Benign Lymphocytic Meningitis. In the past, this disease has been mistaken for many neurological diseases—especially Tuberculous Meningitis. The isolation of the causative virus by Armstrong and Wille in 1934 and its transmission to Rhesus monkeys clearly put the disease on a firm footing. Dr. Vakil in his book has not only drawn pointed attention to the existence of the disease in India but has given a very critical review of the different aspects of the disease. He has also given seven case reports, five of which were observed by the writer in England while working in and studying the reports at St. Thomas's Hospital, and two in Bombay. An exhaustive reference is also given. We congratulate Dr. Vakil on his excellent book.

CORRESPONDENCE

The Madras Medical Registration Department

Office of the Registrar, Madras Medical Council, No. 100, Mount Road, Cathedral P. O.,

Dr. H. S. Hensman, O.B.E., M.R.C.S., L.R.C.P., Registrar, Madras Medical Council, writes to us as follows on 25th July 1940:—

It was observed in the course of the recent elections to the Madras Medical Council as well as the Medical Council of India that the addresses of a large number of registered medical practitioners were either out of date or not known, with the result that an unexpectedly large number of voting and other papers were returned to the office. In order that the addresses of medical practitioners may be correctly recorded in the Annual Madras Medical Register, not only for the purpose of elections, but for the general advantage of the medical profession, I request you kindly to invite the attention of the medical practitioners through the columns of your valued journal to this fact and to suggest that not only their present addresses but also the changes in their address, as soon as such changes occur, should be intimated to the Registrar, Madras Medical Council, in the form shown below:—

1. Regn. Cert. No.....
2. Name as in the Regn. Certificate.....
3. Present (or change of) Address.....

As this is a matter which is in the interests of the medical practitioners in general, I trust that you will whole-heartedly co-operate with this office in our efforts to publish a correct and up-to-date medical register.

NOTICE

5th Maharashtra and Karnatak Medical Conference

Dr. Y. R. Mulay, M.B., B.S., Hony. Secretary, writes as follows:—

"The fifth Maharashtra and Karnatak Medical Conference will be held at Ahmednagar on the 25th, 26th and 27th October 1940, under the Presidentship of Dr. N. A. Purandare, M.D., Bombay."

ADDENDUM

The Antiseptic, Vol. 37, No. 8, page 721 in the article, "Contribution to the Aetiology and Treatment of Amenorrhœa" by L. M. Szamek, M.D.: add the following footnote:—"The endocrine preparations used in the reported as well as in all my cases since the beginning of the war are *Ovocyclin P* (Ciba) and *Lutocyclin* (Ciba)".

CORRIGENDUM

The Antiseptic, Vol. 37, No. 8, facing page 690, in the article, "Disabilities of the Bladder due to Spinal Injuries and their Management" by R. Mahadevan: for the Fig. I. Innervation of Bladder (Diagrammatic) appearing on the above page, please substitute the accompanying one.

Disabilities of the Bladder due to Spinal Injuries and their Management

By R. Mahadevan.

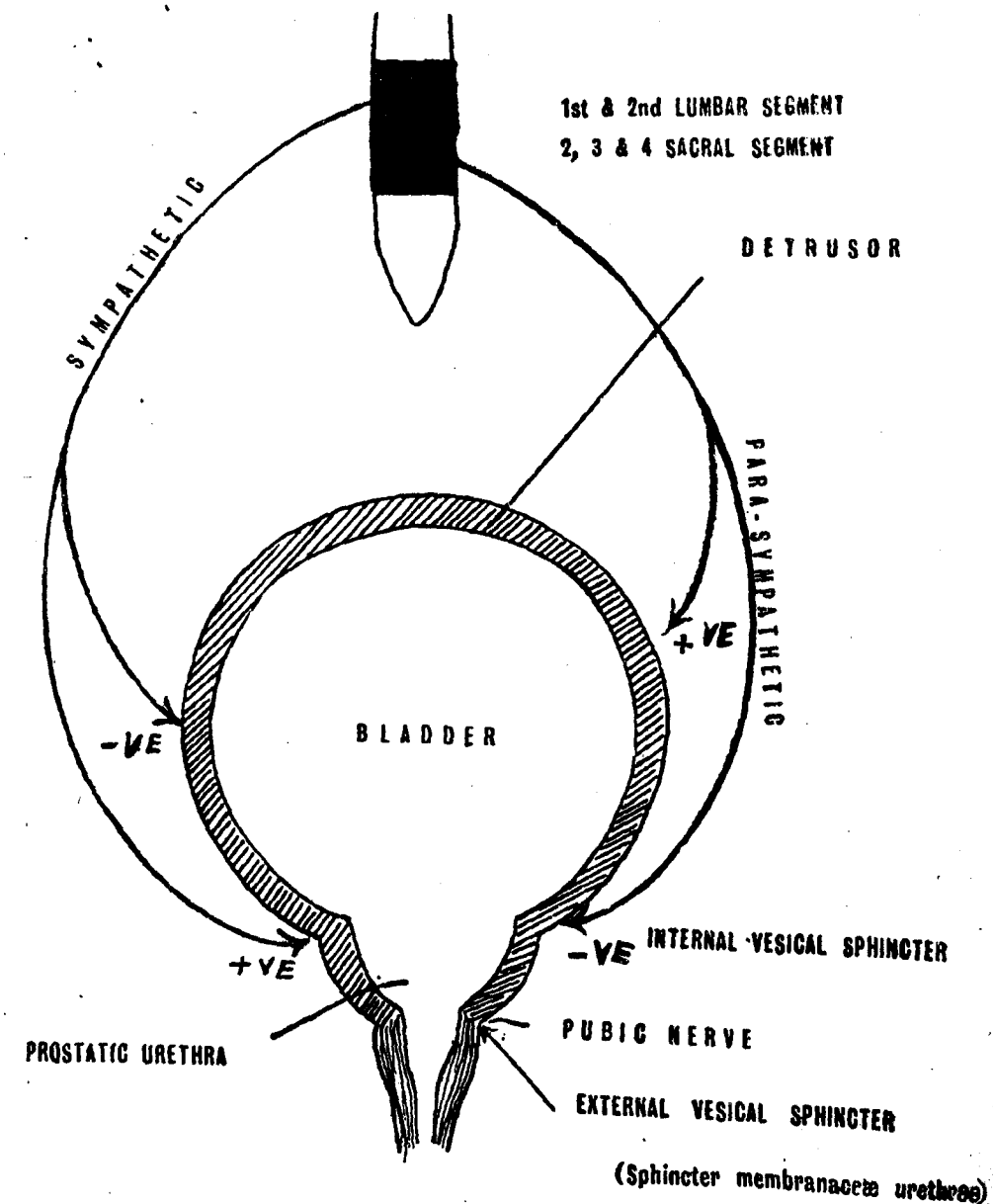


FIG. I.

INNERVATION OF BLADDER. (DIAGRAMMATIC).

To face page 690]

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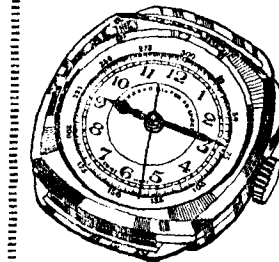
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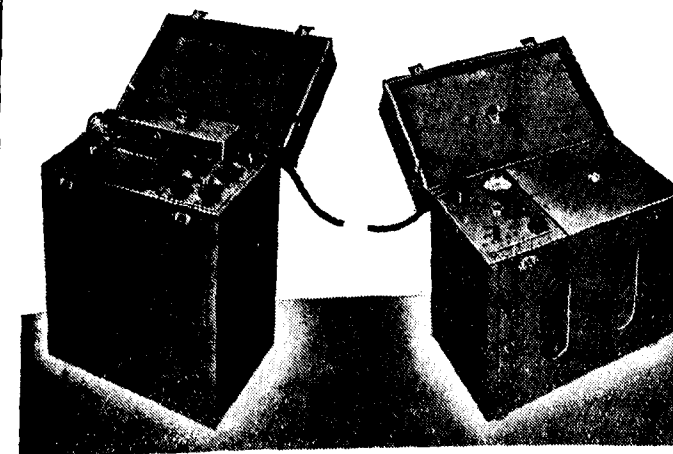
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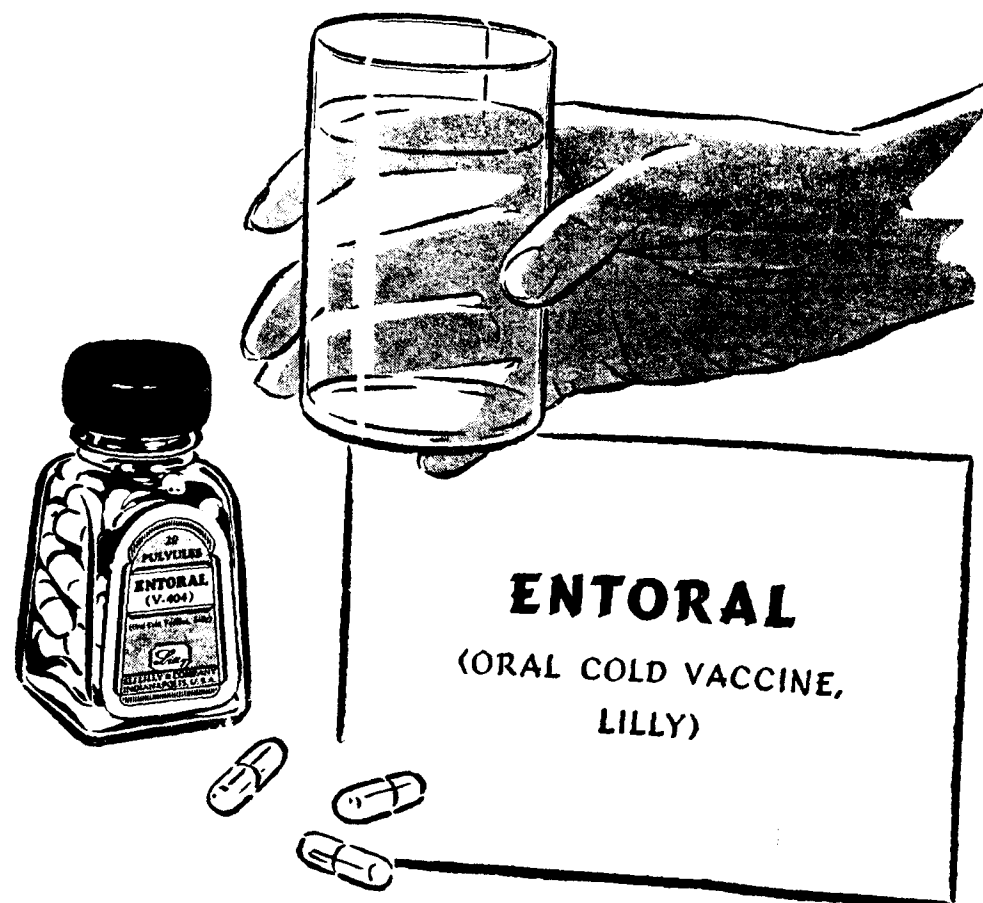
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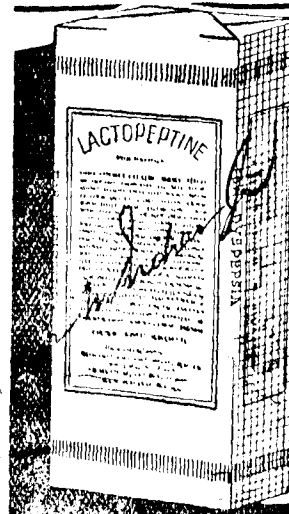
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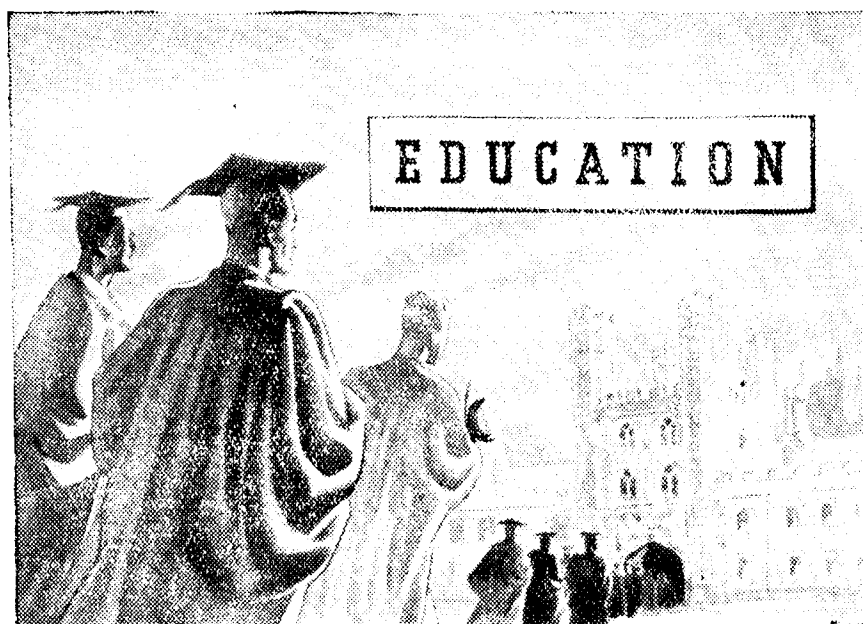
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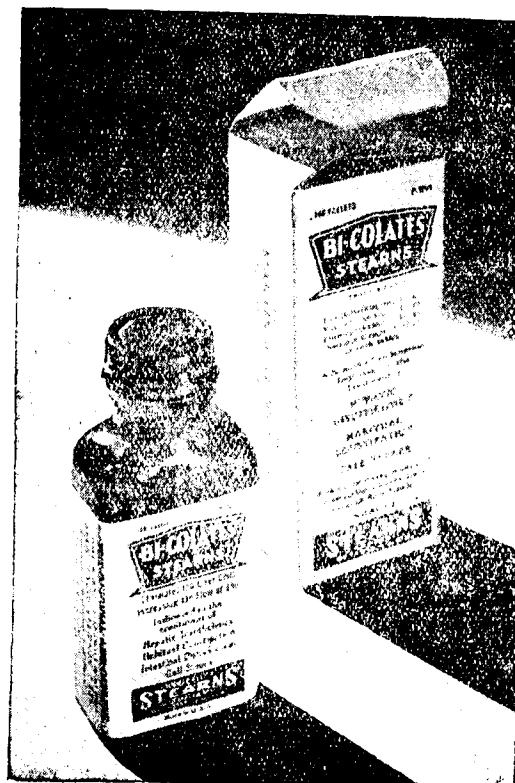
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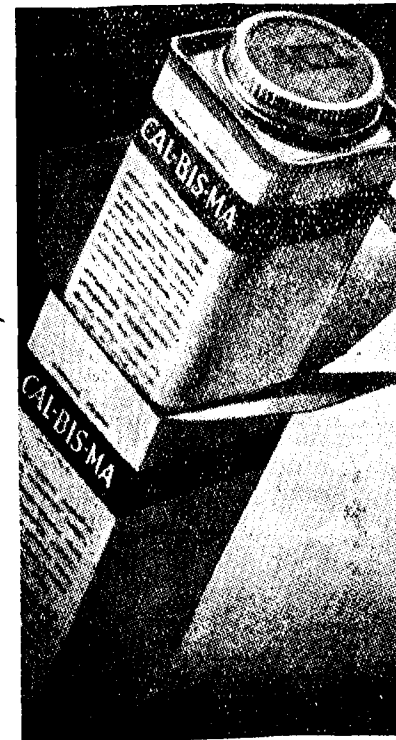
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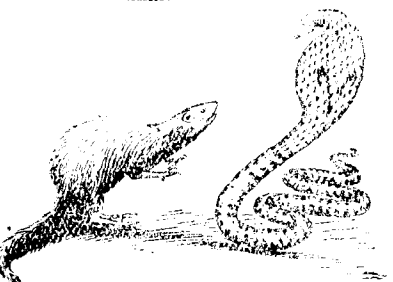
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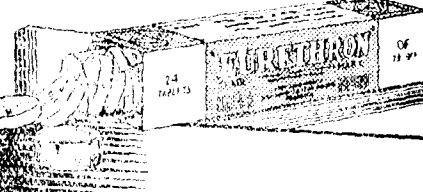
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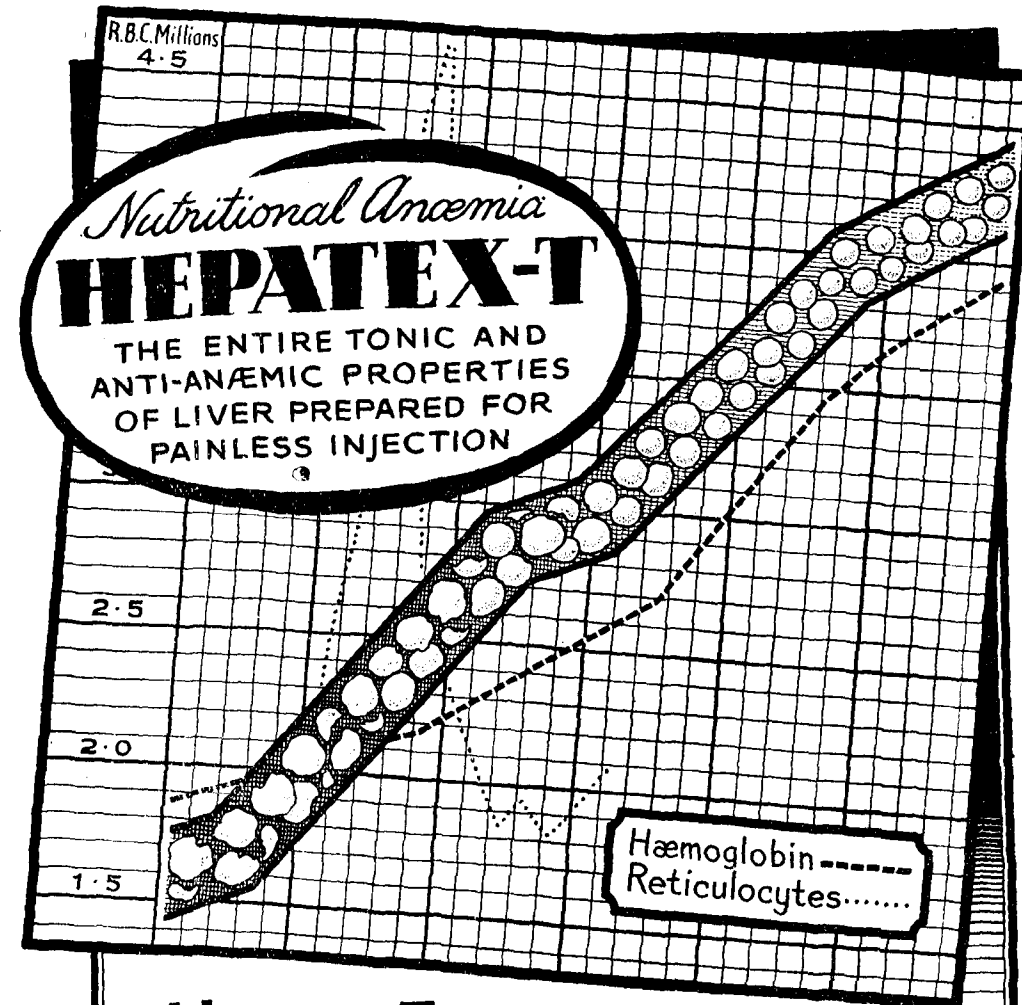
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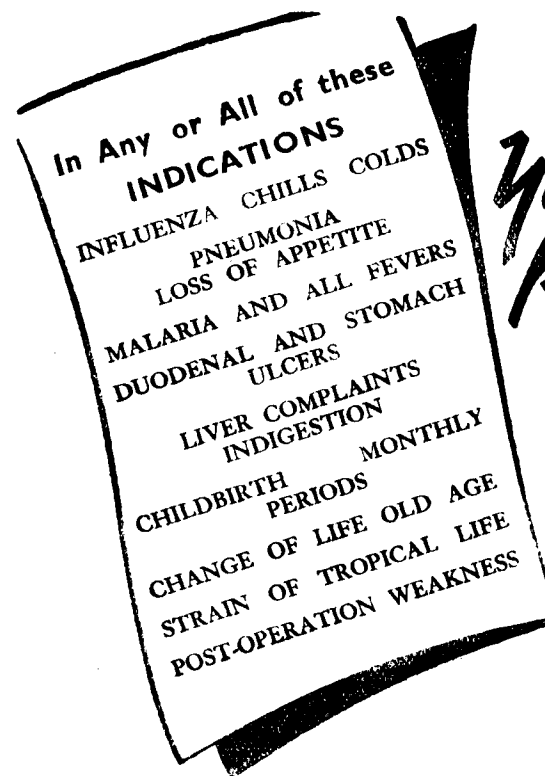
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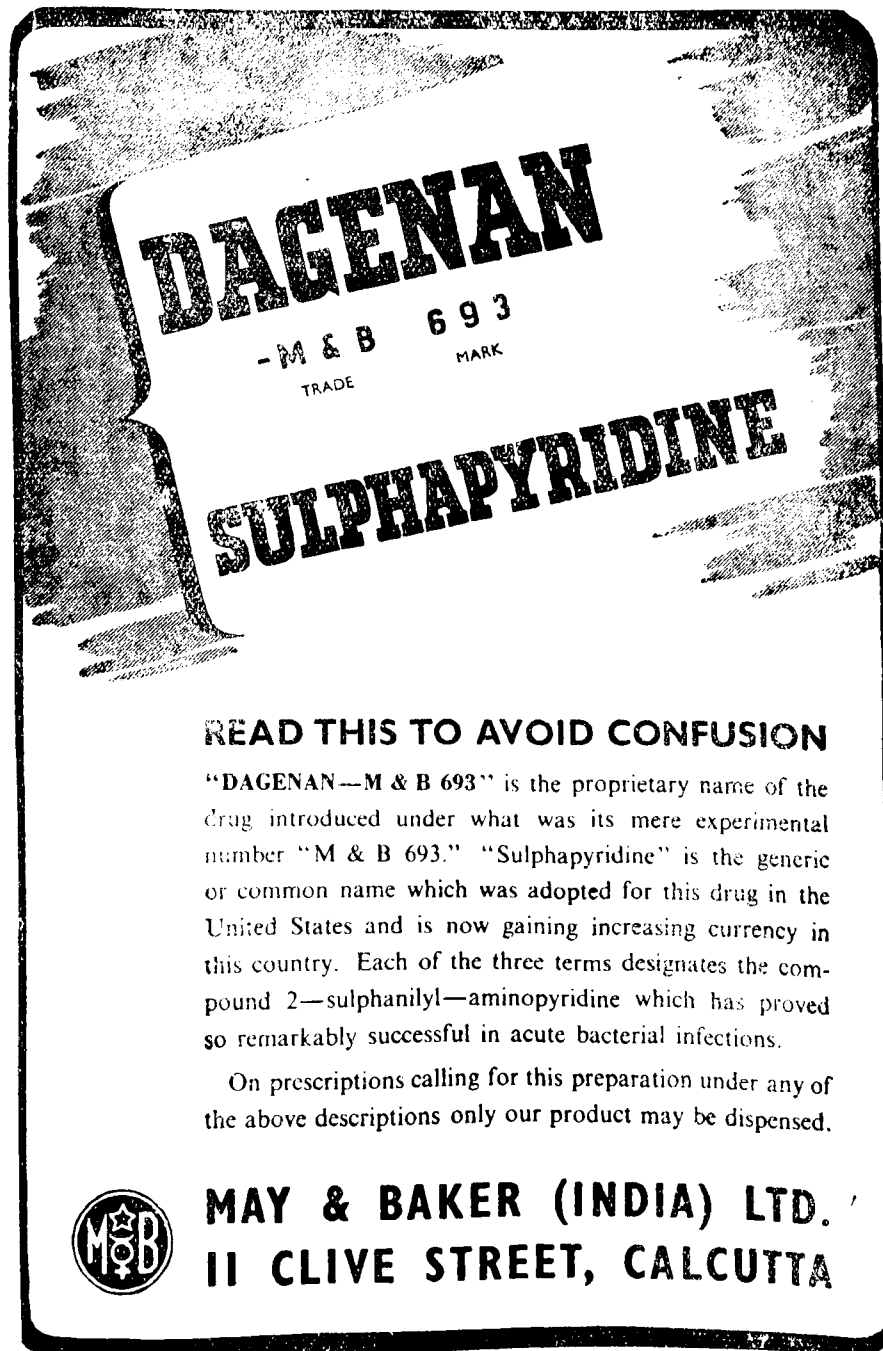


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A Short Account of the Developmental Anatomy of the Respiratory System

BY

R. K. Rau, F.R.C.S. (E.),

Professor of Anatomy, Andhra Medical College, Vizagapatam.

It is customary to give an account of the anatomy, physiology and embryology of a system as an essential preliminary to the rational study of the diseases thereof. In conformity with the recognised procedure, adopted in all teaching institutions, a brief account of the development of the respiratory system has been given hereunder, with the hope that it will serve to refresh the memory of the general practitioner.

The respiratory system, concerned with the utilisation of air, is an offshoot of the forepart of the alimentary system designed for the purpose of converting food into energy. It comprises mainly the two lungs enclosed in the two serous sacs together with the passages conducting the air to the former such as the nasal cavities, the pharynx, the larynx, the trachea and the bronchi with their intra-pulmonary parts and terminal sub-divisions into the alveoli. It is rather difficult to say which part of the system falls within the province of the oto-rhino-laryngologist, which to the general physician and which to the specialist in diseases of the chest. The speciality designated as E. N. T. includes the ear, nose and throat. The throat in popular parlance is but the forepart of the neck containing the trachea and oesophagus. The physician and the surgeon are concerned mostly with the diseases of the lungs and pleuræ which are the principal parts of the respiratory system.

The nose has been omitted by some embryologists from the list of the respiratory organs, perhaps because, this part falls within the

ambit of the speciality. The nose consists of two portions, the external nose and the internal nose. The former is an essential æsthetic appendage imparting dignity and distinction to the features. It is a pyramidal frame work comprising bones, cartilages, muscles, fibrous tissue built up from the pre-oral arches and processes bounding the stomodæum cranially. The internal nose includes the nasal fossæ, conchæ, meatuses and paranasal air sinuses. The nose, besides, consists of the olfactory and respiratory sub-divisions. The anlage of the olfactory organ is a paired convex area of the cranial ectoderm situated on either side of the anterior neuropore. The thickened placodes admit of being recognised as early as third week of intra-uterine life in the region of the external wall of the prosencephalon just cranial to the quinque-radiate stomodæal orifice. The placodes sink from the surface; the pits further deepen into the nasal fossæ. At first, they communicate with the exterior by the anterior nares but end blindly dorsally; these are the primitive nasal fossæ. They meet the stomodæal ectoderm from which they are separated by the bucco-nasal membranes. The primitive choanæ are formed by the rupture of the membranes. The fossæ extend further dorsally and cranially till they become separated from the olfactory bulbs by the mesodermal roof of the nasal capsule. The primitive posterior nares change their position with the increased growth of the fossæ and become the definitive choanæ opening into the pharynx. This extension is inextricably interrelated to the formation of the palate which separates the nasal from the buccal cavity. The palate which is tri-partite in development formed from the unpaired premaxilla or os incisivum and the paired maxillary shelves, like the nose, passes through a primitive stage before it becomes the definitive palate. Coincident with the formation of the palate is the descent of the septum nasi, which fuses with the palate and constitutes the medial boundary of the nasal cavities. A cartilaginous nasal capsule is built up around the nasal cavities. The turbinals—maxillo,ethmo-and naso-turbinals, are carved out from the lateral wall of the nasal cavities. The paranasal air-sinuses arise as out-pouchings of the nasal mucosa. The rudiments of the frontal, ethmoidal and maxillary sinuses are found at birth. They grow rapidly with the commencement of the permanent dentition. The development of the nose is intimately related to the development of the face, the palate, the mouth and lips and cephalic part of the foregut which is the precursor of the pharynx.

The foregut is the cranial diverticulum from the archenteron. It is separated from the floor of the stomodæum by the bucco-pharyngeal membrane. With its absorption, the foregut or the pharyngeal portion of the foregut opens on the surface through the buccal cavity. The membrane is inclined upwards and backwards from just within what will be the lower dental arcade to the roof of the pharynx, near the junction of the basi-sphenoid and the basi-occiput. The primitive pharynx which is but the forepart of the foregut has the pericardium at its floor; its roof is separated from the hind brain by the paraxial mesoderm containing the notochord. Its lateral walls are formed by

the lateral mesodermal sheets intervening between the inner entodermal lining and the outer extodermal envelope. The floor of the primitive pharynx presents a series of eminences and depressions in and about the middle line.

The tuberculum impar formed by the first arches and the lateral lingual buds give rise to the buccal part of the tongue. The hypo-branchial eminence at the median ventral ends of the third and fourth arches gives rise to the pharyngeal part of the tongue and the epiglottis. The elevation called the furcula forms the larynx. The auditory tube is formed from the tubo-tympanic recess of the primitive pharynx: the lateral wall of the tube is derived from the first arch and the medial wall from the third. In fact, the development of various structures of the neck is bound up with the development of the pharynx. The stylo pharyngeus and the constrictors of the pharynx represent the musculature of the third and fourth arches. Those of the palate and larynx belong to the fifth and sixth arches.

Larynx.—For purposes of development, the larynx may be said to admit of a sub-division into two parts, an upper supra rimal or supra-glottic part (aditus laryngis) and a lower infra-glottic part. The rima marks the site in the adult of the original median sagittally placed pulmonary orifice in the ventral wall of the pharynx in the region of the sixth arches. The folds guarding the orifice become the vocal cords. The swellings of the sixth arches just proximal to the pulmonary orifice give rise to a transversely disposed orifice bounded anteriorly by the epiglottis, laterally by the aryepiglottic folds and posteriorly by the arytenoid swellings. The epiglottis is a derivative of the caudal part of the median hypo-branchial eminence formed by the third and fourth branchial arches. The aryepiglottic folds are the remnants of the fourth arches lateral and proximal to the sixth arches. The pharyngo-epiglottic folds, however, are derivatives of the third arch. The arytenoid swellings are derived from the sixth arches. The thyroid cartilage is formed in the ventral part of the fourth arch. The remaining cartilages of the larynx may roughly be said to be the derivatives of the sixth arches; the upper part, therefore, is developed by modification of the floor of the pharynx, while the lower is a modification of the pulmonary outgrowth.

Trachea and Bronchi.—The primitive œsophagus is represented in the early stages by a short constriction between the pharynx and stomach. It undergoes elongation with the development of the lungs and pleural cavities. The upper retro-tracheal segment of the œsophagus is derived from the pharyngeal segment of the foregut and the lower intra-tracheal from its pregastric segment. By about the beginning of the second month of foetal life, the tracheal groove and the pulmonary buds become separated from the ventral part of the œsophagus. This groove called the laryngo-tracheal groove, is formed on the inner aspect of the ventral wall of the œsophageal part of the foregut. The groove deepens to form a tube. Two tubes come into existence by this process, a dorsal pharyngo-œsophageal and a ventral

or laryngo-tracheal. The trachea is developed from the caudal part of the laryngo-tracheal tube. The pulmonary buds are given off from the distal end of the tube. The right bud gives off three vesicles and the left two. They indicate the beginnings of the trilobed right and bilobed left lungs respectively. The bronchi are the stalks of the pulmonary buds. The continued dichotomous divisions of the bud give rise to the extensive ramifications of the inter-pulmonary bronchi which terminate in the infundibula. The alveoli are saccular sessile evaginations of the infundibular walls. The pulmonary buds push their way into the lateral recesses of the original coelomic cavity and acquire for themselves serous investments which are disposed of into a visceral and a parietal part. The basal and sterno-costal surfaces undergo a great degree of development in man. A special peculiarity of the lungs of the orthograde primates including man and the anthropoids is to be found in the ventral bronchi which are as a rule larger, longer and more branched than those of other animals. The transverse diameter of the thorax in primates and man exceeds the antero-posterior. The azygos lobe occasionally met with in man, but constantly found in quadrupeds, occupies the recess between the pericardium and the diaphragm behind the intrathoracic part of the inferior vena cava. Various modifications of the azygos lobe have been described.

Pleura.—The intra embryonic coelomic cavity is at first represented by a continuous recess comprising the ventrally placed pericardium and two lateral recesses on either side of the medially placed structures such as the primitive gut with its mesenteries. These are the pleuro-peritoneal recesses. On either side of the mesially placed dorsal mesogastrium are the pulmonary buds into which the trachea divides. Each lung bud forms the mesial boundary of the pleuro-pericardial recesses. Lateral to each recess is the mesothelial fold continued distally from the mesoderm surrounding the duct of Cuvier of each side. Lateral to the folds are the recesses of the coelomic cavity. The pericardial cavity becomes separated from each pleural cavity by the pleuro-pericardial membrane forming the ventro lateral boundary of the pleuro-pericardial canal. The pleural cavities become separated from the distal peritoneal cavities by the growth of the diaphragm and the sub-ventral or hypaxial musculature.

I must, however, conclude by saying that the foregoing account composed in a hurry is of the nature of a cursory survey, presenting the barest outlines of a subject, which is admittedly an exceedingly difficult and a complicated one.

Pneumococcus and Streptococcus in the Respiratory Tract

BY

Capt. N. Seshadrinathan, M.B.B.S., D.T.M.

King Institute, Guindy.

THE ætiological relationship of the pneumococcus to lobar pneumonia was established by FRAENKEL in 1886. But pneumococci have been frequently found in the throats of normal persons without causing pneumonia. Such cocci are not always pathogenic. But pathogenic pneumococci have been found in the throats of people who are the healthy carriers that distribute the infection when unhygienic conditions such as overcrowding, fatigue, sudden exposure to chilly draughts, debilitating diseases, and injurious chemical and mechanical irritants incidental to industrial occupations, are prevalent. That such pneumococcal carriers exist has been emphasized (*Lancet*, Dec. 31, 1938, commenting on a report of an epidemic of pneumonia in the *Amer. Jour. Hyg.* Nov. 1938).

Pneumococci have been classified into 32 types. The studies of NEUFELD and HÄNDEL in 1909 and DOCHÉZ and AVERY and their colleagues (1915) demonstrated the existence of antigenically different types and grouped them as types I, II, III, and group IV, the last containing miscellaneous unclassified types. It was left to COOPER and her colleagues to analyse these into 29 further types (1929, 1932, 1935).

A study of the distribution of these types in pneumonia brought out the fact that type I is the one most frequently met with in cases of lobar pneumonia (about 30 per cent.), type II relatively infrequent (about 10 per cent), type III fairly frequent (about 15 per cent). The incidence of the other types is comparatively rare. Slight variations of these types do occur in different places and in the same place at different times. Typing of pneumococci is not of mere academic interest. It is made use of extensively in America and Europe for the administration of specific pneumococcal antiserum for curative purposes. It can help in deciding the prognosis of pneumonia to some extent. It can also help in the detection of carriers, an important step in stamping out epidemics.

Typing pneumococci has been very much simplified. The original method of inoculating a mouse to obtain the capsulated cocci for testing has been replaced by a simpler one (NEUFELD'S TEST) which, with a little experience can be done even at the bedside. All that is required is a number of smears of the sputum on slides and the various type sera. The type sera are allowed to act on the cocci in the smears for a few minutes. The capsules of the pneumococci become swollen when coming in contact with the homologous serum, which can be observed after staining with simple methylene blue with a 1/12 oil immersion lens. Since there are thirtytwo types, it is economical

to use pooled sera of type groups as a preliminary step in the identification of the type.

The mode of entry of the pneumococcus in pneumonia* has been experimentally worked out by CECIL, BLAKE, GASKELL, FRANCIS and TURREL. To bring about pneumonia in the rabbit, it was necessary to inoculate pneumococci into the trachea. Subcutaneous and intravenous inoculation only produced septicaemia and death or recovery, without involvement of the lung.

On the other hand, insufflation into the trachea very often resulted in pneumonia following an initial bacteraemia, accompanied by progressive involvement of the lung and crisis similar to the disease in human beings. Fatality depended on the severity of the bacteraemia. The bacteraemia was shown to be the result of pneumococcus finding its way into the blood stream through the lymphatics draining the upper respiratory passages and finally settling down in the lung, the organ of election for the pneumococcus. It was not clear why an initial sojourn in the upper respiratory passages is necessary before the pneumococcus can reach the lung and produce pneumonia.

After the crisis, when the temperature falls to normal, pneumococcal antibodies can be detected in the serum of the patient. The antibodies aid the polymorphonuclear leucocytes in disposing of the cocci quickly from the system.

In unfavourable cases, the pneumococcus may invade the blood stream in large numbers and bring about death without any signs of consolidation in the lungs. It may, sometimes, invade the cerebro-spinal system resulting in fatal meningitis. Or, it may settle down in remote parts of the body like the middle ear, joints, kidneys, and the peritoneal cavity. Among the factors concerned in prognosis, the type of pneumococcus responsible for the infection is also important. Type I pneumococcus, though most commonly met with in pneumonia, appears to be associated with a comparatively favourable prognosis. Type II is similar to Type I in the matter of prognosis. Type III, on the other hand, is associated with a very high rate of mortality. Infection with other types is usually associated with a smaller rate of mortality.

The distribution of types may also vary with age groups. In children, types VI, XIV and XIX are usually found in cases of pneumonia. In adults, types I, II, III, V, VII and VIII are the commonest met with.

In the matter of treatment with anti-pneumococcal serum several factors have to be considered in assessing the beneficial effect on

* Recently ('Proceedings of the Society for Experimental Biology and Medicine', Vol. 43, No. 4, April 1940) KEMPF and NUNGERTER have shown that intravenous injection of pneumococcus in experimental animals (rats) can produce pneumonia after inoculation of sterile mucin intrabronchially. "The presence of mucus material in the lungs or some comparable condition is a necessary predisposition for the localization of the pneumococci".

mortality. The cases have to be selected from the same place and the therapeutic effect tested at the same time, since the clinical severity of the epidemic may vary from season to season and from place to place. The age factor is also important—the mortality rate can be definitely shown to be improved if patients of the age group 20 to 40 alone are taken into account. In the other age groups, the mortality rate is not significantly altered by serum therapy. For types V, VII and VIII also satisfactory serum therapy is available.

To obtain maximum benefit, serum has to be administered in adequate dosage (60,000 to 100,000 units for type I and 100,000 and more for type II) and very early in the course of the disease (within the first three days of the onset.) Typing the infecting pneumococcus is necessary, but it is not wise to wait for the result of the typing before administering the serum. An initial dose of type I serum may be administered immediately after the diagnosis of pneumonia. If, after typing, it is known that the pneumococcus belonged to some other type, the corresponding serum may be substituted. The mode of administration recommended is the intravenous route. The danger of anaphylactic shock, though a very rare event, should be kept in mind. Persons who are sensitive to horse emanations or subject to allergic disorders such as eczema, urticaria, angio-neurotic oedema are liable to get anaphylactic shock. ZINSSER, ENDERS and FOTHERGILL in their book on Immunity recommend that such people should have their sensitivity tested by a skin test or conjunctival test for serum sensitiveness. Other reactions that can occur, but are not of a dangerous nature, are the chills and thermal reactions that follow intravenous serum therapy. These are controlled by a large oral dose of Acid Acetyl Salicylic given simultaneously with the injection.

It is better to give the serum in one dose whenever possible. On account of the likely dangers of such a procedure an initial dose of 2 c.c. per minute may be given. If two hours after this no reactions occur, the rest of the serum may be given.

Two factors contribute to the failure of serum therapy in some cases. Dermal tests may show a demonstrable amount of circulating antibody, but the pneumonic focus may not receive the neutralising antibody on account of the consolidation preventing the access of the circulating antibody. Hence, it is necessary to administer the serum before consolidation takes place. Secondly, it has been shown that an enormous amount of specific soluble substance, the antigenic polysaccharide of the pneumococcus, accumulates in the consolidated lungs. Unless this is neutralised by the antibody, phagocytosis will be prevented.

Streptococci are concerned in the production of scarlet fever and other inflammatory conditions of the nasopharynx, in some cases of broncho-pneumonia in children and, in most cases of broncho-pneumonia in adults influenzal and otherwise.

Normal healthy persons may harbour streptococci in their throats

but these are usually of the non-hæmolytic and non-pathogenic variety.

Most of the hæmolytic streptococci are pathogenic. The classification of the streptococci had been unsettled for some time. At present, streptococci are mainly divided into the hæmolytic and the non-hæmolytic varieties. LANCEFIELD has sub-divided the hæmolytic variety into a number of serological sub-groups of which group A contains the human pathogenic streptococci. Group A streptococci are responsible for inflammatory manifestations in various situations in man. The reactions produced vary according to the site, virulence, general resistance of the host and other factors. In the upper respiratory tract, simple phlegmonous condition of the tonsils and nasopharynx occurs with or without excessive production of toxins. In scarlet fever, a large amount of toxin is elaborated which is said to be responsible for the rash on the skin and the nephritis of scarlet fever. Rheumatism is believed to be caused by toxins of hæmolytic streptococci in the nasopharynx and tonsils. Many cases of bronchitis are due to invasion of bronchi by hæmolytic streptococci. The severity of diphtheria is aggravated by an associated invasion by hæmolytic streptococci. In children, broncho-pneumonia, during measles, has almost always been due to secondary invasion by hæmolytic streptococci. During an epidemic of influenza secondary invasion by hæmolytic streptococci and pneumococci have contributed largely to the mortality rate. In cases that survive from broncho-pneumonia empyema due to hæmolytic streptococci is a common complication.

From the upper respiratory passages hæmolytic streptococci may invade the air sinuses causing empyema of the sinuses or may even invade the meninges causing fatal meningitis.

Hæmolytic streptococci can remain in a latent state in the nasopharynx of individuals without causing symptoms. But such persons can be a source of sepsis to themselves and to others. The present consensus of opinion is that there is practically little or no difference in the strains of hæmolytic streptococci that invade the respiratory passages in broncho-pneumonia and that cause scarlet fever, erysipelas or puerperal sepsis.

The prognosis and treatment of streptococcal inflammations of the respiratory passages have been very favourably modified after the advent of the Sulphanilamides.

The other papers in this valuable special number are likely to contain details about the use of these drugs and so, there is no need to repeat the same here. Still, it will not be out of place to describe the action of these drugs on streptococci and pneumococci on which they act almost specifically.

The action of Sulphanilamide compounds in vivo on streptococcal infections has been experimentally studied in white mice.

The bacteriostatic and bactericidal actions in mice are very slight

compared to the bacteriostatic and bactericidal action as noted therapeutically in man. It was presumed that the drug stimulates phagocytosis. This has been proved to be incorrect. Phagocytes are not increased when the drug is administered. The action of the drug on bacteria has been shown to be to enhance in some unknown way the normal bactericidal action of human blood. Such an action enables very small doses per kilo of body weight to destroy susceptible bacteria in the human body, while very much larger doses are required in other animals. There is some fairly substantial evidence to show that the bacteria coming in contact with the drug undergo some change which enables the phagocytes to destroy the bacteria vigorously. In the case of capsulated organisms like the pneumococcus, the damage is seen to be present in the capsules. Sulphapyridine (M & B 693) acts in a similar manner on the capsule of type III pneumococcus. It may be mentioned that the therapeutic effect of these drugs is definitely enhanced by the simultaneous administration of anti-pneumococcal serum.

Acknowledgments.—In the preparation of this paper, the following references have been consulted:—

1. "The Principles of Bacteriology and Immunity, Second Edition" W. W. C. Topley and G. S. Wilson.
2. "Immunity, Principles and Application in Medicine and Public Health" Hans Zinsser, John F. Enders and Leroy B. Fothergill, 1939.
3. *Bulletin of Hygiene for 1939 and 1940.*

Pulmonary Lesions

BY

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I HAVE chosen to write a note on this subject. My object in writing this note is to put before the readers of this Journal some evidence obtainable by detailed post mortem examination, which will afford explanations of many obscure clinical cases. The modern methods of clinical examination make it possible to detect many more lesions than what our ancestors did. Yet, depending on various factors, some of which are obviously beyond the control of a clinician, numerous lesions are detected for the first time at autopsy.

It will be quite possible to make an exhaustive list of lesions which can only be observed at a carefully planned and thoroughly performed post mortem examination. The following may be taken as commoner examples :—

Adenomas of the kidney, polyps and diverticuli of the gastro-intestinal tract; cysts of the parovarium etc. To this list can be added gastric and intestinal ulcers, parasitic cysts, and certain number of developmental errors. Yet another group can be described consisting of subclinical new growths of organs like the thyroid, the suprarenal, the testis and the ovaries.

Thus it will be seen that a vast field is opened for the compilation of scientific data from which very valuable conclusions of far reaching importance can be drawn.

The list given by me, though not exhaustive, is sufficiently long to arrest attention.

Leaving aside many interesting topics arising out of accidental discoveries in autopsies, I have chosen to write this short note on "Pulmonary Lesions" as a Pathologist sees them. The first reason for my choice is the request from the Editor for contribution to this Special Number. Writing on Pulmonary lesions, as observed in the post mortem room, one has to deal with a mass of facts which are best presented in a tabulated form for ready reference.

Below, I present a table which gives an analysis of one thousand unselected consecutive recent autopsies conducted in this Institution.

I am aware of the fact that the analysis of the post mortems done in different Institutions in our country will not give identical figures; still, such analysis will not fail to bring out similar facts. The lack of complete uniformity will primarily depend upon circumstances affecting the possible incidence of autopsies as related to the total number of deaths in the Institutions. It is unfortunate both from the point of view of the scientific worker and the public at large that greater freedom for autopsy work does not exist. Many Western countries enjoy greater facilities and it will not be incorrect to state that it is these countries which have been able to make greater contribution to the welfare of mankind.

OCT. '40]

PULMONARY LESIONS—P. V. GHARPURE

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LESION.	DETECTED ANTE-MORTEM.	DETECTED POST-MORTEM.
Pneumonia	21 (1 showed abscess in lung)	87 (1 showed pneumococcal meningitis)
Broncho-pneumonia	4 (1 with abscess in the lung)	25 (1 showed empyema 3 showed suppuration 1 was a case of carcinoma larynx)
Tuberculosis	15 (1 showed T. B. meningitis 1 showed ulcers in larynx and small intestine)	158 (2 showed tubercular ulcers in intestine 3 mesenteric glands enlarged 1 showed meningitis 1 associated leprosy)
Suppuration	1	7 (1 was associated with epididymo-orchitis, suppuration in lumbar lymph glands and generalized peritonitis Acute splenic tumour. 2 showed abscess in brain)
Bronchiectasis	3 (1 showed brain abscess)	29 (2 showed softening of brain, left side. 1 showed abscess in left frontal lobe, 1 showed thyroid abscess 1 was a case of leukaemia.)
Gangrene	5	3
Empyema	—	5
Pleurisy	—	2
Bronchitis	1	25
Hypostatic pneumonia	2	8
Emphysema	5	48
Congestion	—	46
Accidents	85 (16 asphyxia with Tardieu's spots) (1 wound of Arch of aorta)	—
Oedema	3	73
Haemorrhage	—	13
Petechial haemorrhage	0	9 (2 with septicaemias 1 gastro-enteritis 1 bacillary dysentery 1 encephalitis with lymphocytic meningitis 1 malaria 1 electric shock)
Collapse	0	17 (1 intra-pleural rupture of aneurysm)
Pneumoconiosis	0	1
Atelectasis	0	1

LESION.	DETECTED ANTE-MORTEM.	DETECTED POST-MORTEM.
Pulmonary embolism	0	5
Brown induration	0	5
New growths:— (1) Primary (2) Metastatic	2	6 (1 showed metastasis in brain 1 showed metastasis in scalp, liver and left kidney)
(2) Metastasis	0	9 Primary in ovary, gallbladder, carcino- ma kidney, lympho-sarcoma, mediastinal glands, carcinoma colon, testis, retro- peritoneal sarcoma and larynx.
No lesions	271	—

The above table represents more or less the average incidence of different lesions met with in the lungs. I must repeat again that the classification may not hold good to many other centres in our country. In large towns, having large migrating populations, there is a constant difficulty of adequate hospital accommodation. Necessarily, the more acute and homeless cases fill up the wards, some of these are too ill to permit any effective treatment. A small proportion of these turn fatal even before a mere formal clinical examination is undertaken. Such circumstances will easily explain why the table given above shows a large proportion of cases in which very elementary type of lesions are listed as being detected first time at autopsy. Such lesions are the pneumonias.

I must mention that the figures given above under tuberculosis do not include the healed solitary foci.

Pulmonary lesions which enable the pathologist to throw light on the obscurity of many clinical cases, which have remained obscure in spite of clinical study extending over a certain length of time, are mainly the following:—suppurations, atelectases and new growths.

It will suffice for my argument to state that an obscure fever is better understood when autopsy reveals an acute suppurating inflammation of the gall-bladder and old suppurating bronchiectatic cavities in the lung and further when a pneumococcus is isolated from the pus in the gall-bladder and the pulmonary lesion. Similarly, a case of large external new growth whose histology is indeterminate, no longer remains a mystery when autopsy proves the existence of a primary bronchogenic tumour and multiple metastatic growth in the internal organs.

Examples could be multiplied to bring out again the truth that post-mortem room work is the back-bone of scientific medicine.

I cite one more illustration:—

A man age about 45, was brought to the hospital for obvious signs of head injury resulting from a fall; he had bleeding from nose and ears, hæmatoma of the scalp, fracture of the skull and very clear indications of injury to the brain. With these manifestations, one is apt to conclude that the resultant fatality was due to traumatism; yet, it will surprise my reader, as it surprised me, to note that a detailed post-mortem examination showed a very interesting combination. Autopsy revealed conclusive evidence of the head injury but the brain showed a new growth surrounded by œdema and recent large extravasation of blood. The new growth was further found to be a metastasis, the primary growth being a bronchogenic carcinoma. Here then is a very outstanding instance that the man got the fracture of the skull due to the tumour which in turn was a result of embolic spread of a cancer of a lung.

Suppurating lesions of the lungs are equally instructive, if not more so, and it is to these two groups that I particularly wish to draw the attention of my readers that I have ventured to write this note. These two lesions are often difficult to spot and yet have very important clinical bearing.

I desire to express my thanks to Lt-Col., S. L. Bhatia, M.C.M.A., M.D. (CANTAB), F.R.C.P. (LOND), F.R.S.E., I.M.S., J.P., Principal, Grant Medical College and Superintendent, J. J. Group of Hospitals, for permission to publish this note. I also wish to acknowledge the assistance rendered to me by Drs. Talwalkar and Wardekar in collecting the data from which the table given in the text has been constructed.

Prevention of Respiratory Diseases

BY

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IN 1937, diseases of the respiratory system were responsible for a little less than half a million deaths (to be correct, 487, 319) in British India alone, out of a total of over 6 million (6, 112, 375) deaths. As a death-dealing group, it is second only to that of fevers in the mortality statistics. But the actual morbidity cannot be properly estimated and must be a great source of loss of wages through decreased output of work even if a person is not actually confined to bed. The incidence of all these diseases can be materially reduced and in the more serious ones, the fatal termination can to some extent be avoided. Within the confines of a single contribution, it would not be conveniently possible to describe even cursorily the methods of prevention of all the diseases caused by infection entering through the mucous membrane of the upper respiratory passages, but an effort will be made here to draw the reader's attention to the more important aspects of the question—especially where a re-orientation of the prevalent ideas has taken place.

Ventilation.—Ventilation is the most important single factor for control of respiratory diseases and would include not only the external ventilation of houses achieved by a judicious town planning, providing adequate "lung" spaces in the cities, but also the ventilation in the house and the room as also the free ventilation of the lungs by the absence of obstruction by nasal congestion, hyperplasia or other defects. Defective ventilation not only reduces considerably the resisting power of the mucous membrane but also prolongs the life of the infective micro-organisms. Requirements about the basis of ventilation have undergone changes—long ago there was supposed to be present in fresh air some principle, "bios", conducive to life which got used up when animals breathed that air; later came the idea of some exhalations from lungs that accumulated in stagnant air and were actually toxic; later still, the using up of oxygen was held to be responsible for the discomfort felt in a badly ventilated room. But the presence of "bios" could not be established nor could the exhalation of a toxic substance be substantiated. The oxygen contents in a submarine can be depleted without discomfort much more than that in a room which felt very close and stuffy. Increase in the carbon dioxide content was next considered the most important item and the recommendations of minimum standards for ventilation (1,000 c.ft. of space per person, 100 sq. ft. of floor space and 24 sq. inches of window area) were based on the idea that at no time should the CO₂ content of air be allowed to be increased by more than 50% of the normal. But CO₂,

per se, is not an objectionable feature and it is now believed that it can be safely taken as an index of the pollution of air but the real basis of adequacy of ventilation is the cooling power of air. When, due to the presence of a number of persons in a room, one starts feeling some discomfort, it is due to the fact that the body heat is not lost rapidly enough into the surrounding air owing to its having become warmer, more humid and stagnant. If, at this stage, the air can be set in motion by a fan, the discomfort is materially reduced even though the composition of air remains the same.

Adequacy of ventilation, therefore, is now-a-days reckoned by finding out if the heat produced in a person, depending on the nature of the work he is doing, can be conveniently dissipated into the surrounding air—its capacity to do so can be determined by registering its temperature, humidity and velocity of movement. If the air is not cool enough nor dry enough nor adequately moving, at first there will be a vaso-dilatation of the superficial vessels of the skin and later sweating to increase the heat loss. Both these conditions are taxing to the system and in modern industries, where efficiency of labour is the sole criterion in workshop practice, the system of "air-conditioning" has been developed. Its purpose is to keep the air such that its cooling power would correspond to that of a completely saturated and still air at a temperature of 63°-72°F. "Air conditioning" has now come to stay, not only for factories but also for large meeting halls, living rooms, and even railway compartments. The process further admits of the removal of suspended impurities like dust particles and "droplets" of mucus with enclosed bacterial flora, and thus not only is the mucous membrane of the upper respiratory passages saved from the strain of adjusting itself to the very widely changing physical conditions of the inhaled air, but is further shielded from the irritation produced by the dust particles and the possibility of inhalation of the infectious materials in the droplets. A number of instruments have been developed for objectively measuring the cooling power of air, but the most convenient and quite a reliable guide can be the first subjective feeling that one will get on walking into a room from the fresh air outside: if one feels the room stuffy, it is almost surely inadequately ventilated. Care should, however, be taken to notice the first impressions; for, soon the sensibility gets dulled and becomes unresponsive.

Immunisation.—Except in the case of diphtheria and scarlet fever, it is not possible to confer any immunity by the use of toxins or vaccines. They have been tried in common colds, influenza, cerebro-spinal fever, pneumonia, but no clear-cut benefit has been observed. They do control to some extent the development of secondary infective organisms in the nose and throat, hence, make the disease more bearable.

Nutrition.—The state of nutrition is an important consideration from the point of view of any infectious disease—good nutrition reducing appreciably the incidence of infectious diseases and ensuring

recovery in a greater percentage of cases. This is more noticeable in the diseases of the respiratory tract and the presence of a good reserve of vitamins A and D has been found to be a good protective, both against the disease itself as well as against the development of untoward and serious complications during its course. This is most marked in case of common cold, measles, whooping cough and tuberculosis.

Over-crowding.—This factor is intimately associated with inadequate ventilation. The effect is produced more markedly through increasing the chances of transference of droplet infection, *i.e.* while the infective micro-organisms are still in their unimpaired activity, they get a chance, on account of a larger number of persons being placed close together, of entering the respiratory passage of a new host. Over-crowding is almost invariably associated with poverty, inadequate food supply, insufficient clothing, dirt and squalour which all tend to reduce individual resistance to the disease. Over-crowding is responsible to a great extent for the epidemics of cerebro-spinal fever and spread of tuberculosis.

Ignorance of the risks from infection is the result of general lack of education and of correct information about the manner of spread of disease. A doctor who comes in contact with the patient and his relations is in an unenviable position to spread correct information about the causation of these diseases and the measures that are possible for combating them, within the means of the family.

"Carriers".—The "Carrier" state is the biggest handicap that we have to overcome in the prevention of this group. The carrier is capable of doing the mischief before it can be appreciated and is, to some extent, even more dangerous than a frank case of the disease, because many a man instinctively tries to avoid a sick person. In many instances, it is not easy to detect the carriers (*e.g.* *Micrococcus* or *Neisseria* Meningitidis) and in a small proportion of all carriers, it is impossible to eradicate the infection and render them safe. The percentage of carriers (normally about 2%) increases markedly upto 20% after an epidemic.

"Droplet" Infection.—In talking, singing and shouting, very small drops of mucus are projected from the mouth; more so in coughing or sneezing. These small drops remain suspended in the air for a short time, and get carried about. The length of time of suspension would depend upon their size, the temperature and humidity of air, the presence of smoke or other suspended material in it and on the movement of air. The distance which they can reach would depend upon their initial velocity of projection, the length of time they remain suspended, and upon the air currents. FLUGGE was the first to suggest that these tiny droplets of mucus contain micro-organisms from the naso-pharynx and thus infection of persons inhaling them can take place. Obviously, the shorter the distance the greater are the chances of transference of infection in this way and the infection of nurslings by their mothers is heaviest. Sneezing or coughing

would easily result in the "droplet" infection being carried a distance as great as 30 ft. Many of the "contagious" (as distinct from infectious) diseases are spread by "droplet" infection. Even when the droplets dry up and fall to the ground, the contained micro-organisms will be present in the dust from the floor etc.

Diphtheria.—Although we in India are quite susceptible to this disease (Schick positive), and the infection is fairly frequently come across and in most instances not much care is taken, we do not find such widespread epidemics of the disease as used to occur in the pre-immune-serum days in Europe. But even then it would be advisable to consider here the prevention of diphtheria first of all; for, from the point of view of preventive work, it is now the ideal disease. Because:

- (a) The causative organism is known, and diagnosis of cases as well as of carriers can be made with a surety not attainable in many other diseases;
- (b) The susceptibility to disease of individuals can be determined by means of the Schick's test, so that the children at risk can be separated from those who are not so;
- (c) Specific and efficient method of treatment is known and now easily available;
- (d) A satisfactory method of immunization is available so that all the susceptible persons can be immunized and protected from the disease.

The existence of these facts gives us immense help in the control of the disease which becomes certain, expeditious and non-controversial. Taking as an example, a residential school, where ideal conditions for control can be more conveniently brought about than in any other community of similar size, the following measures will be taken.

1. The patients are isolated and treated vigorously with anti-serum.
2. All the children are examined clinically and those with signs of any disease are watched particularly.
3. At the same time, throat swabs are taken from all children and smears and cultures prepared from them.
4. All the children are Schick tested.

As soon as the results of these tests are available, it will be possible to divide the whole school population into the following groups and take the appropriate preventive measures.

- (a) Schick positive, swab negative and culture show absence of virulent organisms—these are susceptible children and there is no infection in them. They are to be immunized by Toxoid anti-toxin mixture.
- (b) Schick positive, swab and culture show true diphtheria. These are children in the incubative stage of the disease. If they have shown any local signs of disease, they would

already have been placed on the appropriate treatment, otherwise, they are to be treated as cases of diphtheria, detected in the very early stages of the disease and isolated.

- (c) Schick negative—swab and culture show true diphtheria. These are the "carriers" of infection and this condition should be cured by energetic treatment.
- (d) Schick negative—swab and culture negative. These children are immune and so no more trouble need be taken about them.

Thus, from the point of view of prevention, diphtheria offers us the ideal conditions. With other diseases, something or other is wanting in our knowledge about the disease and hence we suffer from a corresponding handicap. The greatest handicap is when one does not know of an efficient method for conferring immunity. It is a surprising thing that, in the realm of medicine, we have the best preventive measure for a disease of which the causative organism or virus is not known—small-pox and vaccination; while there is another of which the organism was one of the first to be discovered (tubercle bacillus—1892) and although almost half a century has rolled by, a sure preventive is unknown. Between these two extreme conditions, the other diseases occupy various positions from the point of view of prevention.

Influenza and Common Cold.—Influenza has been defined as the "newly found haven for the diagnostically bankrupt". No doubt, many a diverse ailment is found included in this diagnosis and not only the severity of the disease but the social status of the patient 'helps' in the correct diagnosis. It would be, however, convenient from a practical point of view to confine the term "influenza" to the epidemic (most often pandemic) that visits after a number of years and the term "common cold" to the affection that we have always with us—year in and year out.

Though all are agreed that Peiffer's influenza bacillus (now designated *Hæmophilus influenza*) is not the causative organism of influenza, and that the disease is caused by a filtrable virus, opinions differ widely as to the virus itself. Soon after the last pandemic of 1918-21, OLITSKY and GATES found a filter passer which they called *Bacillus Pneumosintes* (because of the injury it caused to the lung tissue). Soon after, this followed the influenza bacillus into oblivion. Now-a-days, the virus isolated in 1933 by SMITH ANDREWS and LAIDLAW, holds the field. It was isolated from ferrets in which throat washings from human cases had been instilled through the nose. The virus causes a pneumonia in mice. There is little evidence of a permanent immunity after an attack of the disease, and no methods of successful immunisation are known. From previous experience, it appears that while it is impossible to prevent the onset of influenza, it is certainly possible to prevent serious injury to lungs from an attack of influenza by ensuring an optimum resistant state of the respiratory mucosa by adequate

vitamins A and D intake, by reducing the number of secondary infections by attention to the hygiene of nose and throat and by maintaining the optimum general resistance by adequate exercise and rest.

But common colds are always with us. They are very highly infectious and although they mean quite a lot from the efficiency point of view, they do not usually cause much suffering or endanger life. Thus it is that we are inclined to ignore them or treat them lightly. They are a "nuisance" no doubt and, in industrial output, they do produce an appreciable decrease. As a result of elaborate studies made in the more highly industrialized Western countries, they have been able to evaluate the loss in productivity which, though quite a small one "per cold", does amount to a considerable sum collectively; and efforts have been made to reduce the number of colds in the workers in a factory. In one such experiment, vitamins A and D, ultra violet radiation, a dissolved vaccine, an entoral vaccine were used; ultra-violet radiation was the only one which gave a result significantly different from that in controls who received no treatment at all, or from those that received the other prophylactic treatments. The dissolved vaccines group showed actually an increased susceptibility.

Streptococcal infections of throat, as distinct from the condition associated with common cold, is an important condition, for it is from an infection by the hæmolytic strains of streptococci that serious complications may arise *e. g.* scarlet fever, empyema, endocarditis, and valvular disease of the heart, nephritis, puerperal sepsis etc. What exactly determines the onset of one or other of these is not yet quite definitely established. The strains involved in the various types of local lesions appear to be serologically the same—which is very satisfactory from the point of view of therapeutics, because the same anti-serum can be used with benefit for the different conditions. There are grounds to believe that the same strain may behave differently in its pathogenicity, perhaps determined by the resistance of the tissues; sometimes its "toxicity" is very marked producing scarletiform or erysipelatous condition, at other times its pyogenicity is more noticeable leading to empyema, root abscesses, puerperal sepsis etc, while yet again its invasiveness may be the more important factor producing a septicæmic condition. Hence, it is important to ensure that the chronic infections of the throat receive adequate attention. It is in this connection that the perennial tonsil question has come up for examination again. It is now agreed that caution should be exercised in their removal and only those tonsils removed which show marked fibrosis, necrosis or abscess formation. Routine removal of all enlarged tonsils is objectionable in as much as it removes the first barrier put up by the body against infection.

Cerebro-Spinal Fever.—This occurs chiefly in schools, jails, soldiers' camps, wherever over-crowding, with consequent intimate personal contact and droplet infection can occur. Apart from the frank cases of the disease, "missed" cases who are not ill enough to

upset their normal routine of work, and the "carriers" play a very important part in the spread of the disease. In an epidemic as many as 8-12 missed cases and 20-30 carriers have been observed per case of the disease.

Infection seems to be more from droplets than from fomites, for the organisms do not survive even for a short period of time in the outside air. So much so, when cultures are to be prepared, it is recommended that the media should be warm and immediately after the inoculation of the tubes, they should be put back in the incubator, which should preferably be placed in the ward to ensure that organisms do not get 'chilled'. The use of the immune serum has materially reduced the mortality, while prophylactic vaccines have been tried but not with consistent beneficial results. Immunity after an attack is not lasting and infection can take place in persons who have had the disease. Over-crowding should be avoided and in an institution like jail or army barrack, fresh arrivals should not be mixed with the old residents for two or three weeks, so as to make sure that none of them is bringing in the infection. Fatigue is a major contributory factor in the production of disease and hence new arrivals should not be put to severe muscular work.

Pneumonia.—Pneumo-cocci have been found to belong to a number of serological types. With types 1&2, antisera of a highly curative value can be produced, while types 3&4 do not produce many anti-bodies. Thus, in the early stages of pneumonia, a mixed serum of type 1&2 is given and typing of organisms undertaken. This can best be done by isolating them in a pure culture and then performing agglutination test against known immune sera; but this, however, takes time and a quicker method has been developed. It consists of the placing of a small quantity of sputum at three spots on a slide and mixing it up with the three types of sera. With the homologous serum, the pneumo-cocci show swelling up and clouding up of the capsules which can be easily recognized by a little practice and as soon as the type of the organism causing the disease has been determined, treatment by the appropriate serum is undertaken.

Whooping Cough and Measles.—Both, diseases of infancy and childhood, cause such extensive damage to the lung tissue that almost invariably in young children broncho-pneumonia supervenes. They are very highly infectious and great care has to be taken in preventing spread of infection by isolation. Pertussis vaccines have been tried for prophylaxis as well as for treatment, but they have not succeeded to a marked extent or produced consistent effect probably because local strains showing antigenic differences had not been employed. In both the diseases, increasing the tissue resistance by large quantities of vitamins A and D internally have been beneficial and should be tried.

Pneumonic Plague.—Though this disease has not been frequently met with in India, although Bubonic plague is common enough, yet cases have occurred and some have been reported from very cold dry places. It is very highly infectious and almost invariably fatal and

hence the possibility of its presence should not be lost sight of in practice.

Prevention of Pulmonary Tuberculosis.—CAUSATION. 1. *Infection* by tubercle bacillus usually takes place quite early in life and now-a-days, the consensus of opinion is that the effect of this early infection, if not very massive or frequently repeated, is not so very harmful, rather it serves to confer some immunity. The greater resistance shown by the average city dweller as contrasted with the ready succumbing to a virulent form of the disease of men from villages is now generally believed to be due to an immunity acquired by an infection at an early age.

2. *Inheritance* of the infection does not usually occur. Some evidence has been adduced to show that infection can be transmitted from mother to child in utero but there is every reason to believe that it does not ordinarily occur. What most often happens is that a child, when born of a tubercular mother, receives heavy and repeated infections in the most susceptible period of its life. Sometimes, it is held that a susceptibility to the disease in the shape of some predisposition to infection or decrease of the local resisting power of tissue (a weak chest) is inherited. This is very easy to assert, difficult to prove and even harder still to disprove. What most probably does occur is that the "inheritance" is more in the environment into which the child is born in the shape of the physical comforts (or rather discomforts) and the economic conditions. Thus, the habits of life, particularly those referring to food, ventilation, cleanliness, etc., have a more potent effect than any inherited weakness of lungs, throat etc.

3. *Over-crowding*:—Too many houses per square mile of land, too many rooms and families per house, too many persons to a room. The full force of the overcrowding is not realised unless and until the housing figures are analysed. Thus, from the census of 1931, the following state of affairs is revealed:—

In Cawnpore, there were 21,969 families (or more than 35% of total number families) living in homes with more than 2 persons to a room, and about 6,500 families or 10.5%, with more than 3 persons to a room. The density in some of the Mohallas rose as high as 300 persons per acre and in one Mohalla it rose to the record figure of 1,200 persons per acre. It is hoped that conditions have since then changed for the better, but it will be some time before the ideal conditions can be obtained. Overcrowding in non-industrial towns and even in rural areas is equally bad nor the amount of space available per person is hardly adequate for a fairly big proportion of the population.

4. *Family Economics*:—In the realm of family economics, the disease is self-perpetuating i.e. more than any other disease, it brings about conditions that favour its growth. Tuberculosis is caused through an unsatisfactory financial condition of the family leading to bad food, inadequate clothing and poor house accommodation. The long-drawn out course of the disease, the prospects of relief through

a costly sojourn in the hills, the prolonged course of treatment and in the case of adult males, the cutting off of the family income leads to an aggravation of the conditions that induce the disease. Added to this, is the factor that the presence of an open case in the family leads to greater chances of massive infection.

5. *Industrialization* :—On account of the better wages paid in the industry than are available in work in fields, industries can get labour turn-over much more easily here than in other countries, with the result that they usually do not worry about social service work amongst their employees. Of late, the bigger industries which are better organized have developed some labour colonies. In the absence of any special housing scheme, the workers have to find their own lodgings and as a result we find considerable overcrowding and it is these workers who contract the disease in cities and when ill, carry the infection to their homes in rural areas.

Every worker in the field of tuberculosis prevention, feels that the disease is steadily increasing and unless some early steps are taken the problem will become a very serious one. Luckily, the scheme launched by H. E. the Marchioness of Linlithgow for expanding the King George's Thanksgiving Fund into a National Tuberculosis Association, has come at a very appropriate moment. It is incumbent on every practitioner of medicine that whenever he comes across a case of tuberculosis, he should not treat him as an individual case, but should take into consideration the position of all the members of that family, and make sure that no fresh infections take place there. Leaving the question of the actual treatment aside, it is important that a case should be reported to the authorities as early as possible, because only then can a correct estimate of true extent of the disease be made. From the point of view of the patient, an early diagnosis is also very necessary, for many a case is at present allowed to go away unimpressed with the necessity of taking proper care, treatment and precautions, simply because the doctor was not sure of the case being one of tuberculosis. "Giving the patient the benefit of doubt" should consist in treating a case as of early tuberculosis even though he may not be really so rather than the other way round. The patient could be properly warned to take all precautions not only in the interest of his own health but also of those whom he holds near and dear. It is the duty of the doctor to try and find out whence the infection probably came and to whom it can be given. Unless and until every practitioner feels it his duty to actively enrol himself in the campaign against this fell disease, not much headway can be made in its control.

X-Rays in the Diagnosis of Diseases of Lungs and Pleura

BY

M. D. Joshi, M.B.B.S., F.C.P.S., D.M.R.E., J.P.

Bombay.

EVER since the great invention of X-rays by ROENTGEN, they are used as ready means of visualising the condition of the thoracic viscera and detecting any changes in the shadows of lungs, bronchi, and pleura. It clearly demonstrates caseated and calcified foci, reveals airless area of lung tissue and so helps in establishing an anatomical diagnosis.

X-rays, when properly used, help materially in disclosing certain pathological conditions. They are especially valuable in diagnosing deep seated T. B. lesions, pleural adhesions, enlarged bronchial glands localized and interlobar effusions, localised pneumothorax, small cavities in the lungs, abscesses and gangrene of the lung, basal adhesions, sub-diaphragmatic abscess and upward enlargement of liver. They are also useful in diagnosing benign and malignant tumours in the chest. They give good ideas as to the progress of the case in treatment of artificial pneumothorax which gives such striking results in tuberculosis.

Whether the changes revealed by X-rays are tuberculous in character and whether the lesion is active or healed, must be ascertained by other clinical methods because roentgenography, though a very important aid in diagnosis, has got its limitations and cannot be relied on to the exclusion of other methods. Whatever is seen on the skiagram are the shadows of different densities cast by the diseased organs. When interpreted in conjunction with clinical symptoms, the X-ray examination yields the best results.

Routine method of examination of cases suffering from affection of lungs and pleura is as follows :—

History of the patient must be carefully taken down; that gives a good deal of clue to the diagnosis. The country where he lives, his occupation, whether he works in gold-mine or asbestos factory, whether his work is connected with sand, stone or metal. Family history and present condition such as fever, loss of weight and cough, should be considered also. After that, there should be careful clinical examination of the patient. Then the patient should be prepared: that is, if there are any metallic things such as buttons, ornaments or any other application, applied to the chest and which may give shadow should be removed. If there are any moles or scars those should be noted. The patient should be screened first in anterior-posterior, lateral and oblique views before taking a skiagram. The following points should be noted in screen examination.

1. *Apices* :—Normally, they should be of equal intensity on both the sides after deep inspiration. If they are found to be of unequal intensity, the patient should be asked to cough. Healthy lung is cleared up while diseased lung tissue remains opaque.

2. *Ribs* :—Ribs horizontal indicate pulmonary emphysema. When horizontal setting is unilateral and lung markings are absent, pneumothorax is to be suspected.

3. *Lungs* :—If the opacity is homogenous, generally it is due to thickened pleura. Discrete opacities are due to involvement of lung tissue. Mottled appearance all over the lung is characteristic of miliary tuberculosis. Rarefied area surrounded by a circular ring indicates cavity in the lung. Mottling of the lung shadow is more marked in the active stage of tuberculosis. Fibrotic changes appear when it is healed up.

4. *Hilum Shadows* :—They are enlarged in tuberculosis, but any chronic irritation may cause the enlargement. In conjunction with clinical data, this condition aids in diagnosis.

5. *Peribronchial Thickening* :—It is generally present in tuberculosis and gives characteristic "Tree root" shadow. It is present in chronic bronchitis and asthma. Any chronic irritation, cancer of the lung, or even simple old age may cause peribronchial thickening. So, its presence does not always mean tuberculosis; with other clinical data, it is useful in diagnosis.

6. *Size, Shape and Position of Heart* :—In many cases of tuberculosis, the heart is smaller in size and is vertically placed. If there are any adhesions present, it is dragged over to that side. Presence of fluid or air pushes the heart to the other side.

7. *Costo-Diaphragmatic Angles* :—Angle should be long and sharp. During inspiration, it enlarges and brightens up. It contracts and loses its brilliancy to some degree during expiration. Any diminution in its size or obtuseness of its apex or its complete obliteration, indicates pathological process of pleura or lung.

8. *Movement of Diaphragm* :—It is $\frac{3}{4}$ of an inch in ordinary breathing. In forced breathing, it is two inches. The movement less than normal indicates emphysema or T. B. fibrosis of lung. Movement of diaphragm is restricted by thickened and adherent pleura after pleurisy. It is no more smooth but shows marked elevations of the curve during inspiration and also irregularities of the contour and in some cases, bands of connective tissue are seen passing from diaphragm to the lung.

Skiagram should be taken at different positions and at a fixed distance, so that the subsequent skiagrams can be compared with the former ones.

Similar shadows are cast in skiagram by different pathological conditions and that is why one must be very cautious in giving his diagnosis. History of the case, clinical examination and examination

of sputum should be taken into consideration before one comes to a definite conclusion. Broncho-pneumonia, miliary tuberculosis, pneumoconiosis and carcinomatosis of lungs, all give nearly similar pictures. Mottled appearance is seen in all these pathological conditions, but the history and clinical examination helps to come to a definite diagnosis.

In T. B., we find less air entry in the part of the lung affected and mottled appearance. In old cases, cavities are formed on account of necrosis and liquefaction of lung tissue due to poor resistance and heavy infection. T. B. cavities are generally not seen filled but always empty. In miliary T. B., mottled appearance is seen in both the lungs all over.

When healing takes place, linear opacities are seen in the skiagram suggesting formation of fibrous tissue.

By X-ray examination, it is usually possible to detect a new growth in the lung at an early stage and also to localize its position in chest. Benign tumours, fibromate dermoid cysts, hydatid cysts, and malignant growths—especially extra pulmonary—can be easily demonstrated by the production of artificial pneumothorax.

Intra-tracheal injection of Lipiodol may show the irregular stenosis of bronchus and is characteristic of a carcinoma.

Primary carcinoma of the lung arises from the bronchus. Primary sarcoma very rare. Metastatic growths are seen in the lungs which give puff-ball opacities. Abscess of lung, bronchiectasis and bronchial carcinoma in the lower part of lung sometimes give difficulty in diagnosis. Clinical examination of pleural fluid if present sometimes helps in diagnosis. Microscopic examination of the pleural fluid shows malignant cells.

Affection of Pleura.—Pleurisy :—In acute cases, there is reflex inhibition of diaphragm. When fluid is present, Ellis curve is seen and the heart and mediastinum is pushed to the opposite side. When fluid is removed, X-rays help to show whether there is any fluid still left, whether the lung is affected or not and in some cases cause of effusion.

X-rays help to find out encysted effusion and inter-lobar pleurisy and concealed effusion between the lung and dome of diaphragm.

Tumours :—In endothelioma of pleura, irregular opacities can be seen on pleura. Typical cells can be found in the pleural fluid.

Tumours of the mediastinum can also be detected.

On The Diagnosis of Respiratory Diseases

BY

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My object in writing this article is to emphasise the importance of a proper appreciation on the clinical characters of a case in the diagnosis of the disease. The medical student under training finds the teaching institutions equipped with all modern apparatus that are of help in the investigation and treatment of diseases, and there are also bio-chemical, bacteriological and pathological laboratories attached. These are no doubt of great help in diagnosis, but they should serve only to confirm or negative a clinical diagnosis. They should only be adjuvants and should not take the place of a clinical examination. There are good reasons for this. The student after qualifying will find, when he settles down for practice, that in most places the additional facilities are not available, and he will have to depend only on a proper clinical examination for diagnosis. Even if such help be available, as in cities and district headquarters, the patient may ill-afford to pay for such investigation. Thirdly, they are only of limited application. I should not be understood to decry the great help that the radiologist and the various laboratories give us; their help is invaluable in many cases. I wish only to emphasise the importance of a proper clinical approach in diagnosis.

The following are the steps in the diagnosis of respiratory diseases:—history, symptoms, a proper clinical examination to find out the abnormal physical signs and lastly certain investigations like the examination of the blood and sputum, radiological examination, and exploration. We shall consider these seriatim.

The *history* and *symptoms* go together. Of the respiratory diseases that can be diagnosed mainly from the history are asthma and pulmonary tuberculosis. A history of paroxysmal attacks of *dyspnoea*—mainly nocturnal, that wake the patient up and make him sit up in a distressed condition and disappearing spontaneously or after treatment (mixture, inhalation or injection), is usually sufficient to diagnose asthma. But there are fallacies to be borne in mind. Sudden left ventricular failure in hypertension will cause a picture almost like asthma—‘cardiac asthma’. A fairly healthy adult had been having essential hypertension with left ventricular hypertrophy since some time. He had congestive cardiac failure on one or two occasions. A medical friend happened to express his satisfaction of the good progress of the patient while he met him at a function. At about midnight, the patient woke up with sudden *dyspnoea*, and the doctor friend found him, in a condition of extreme distress, sitting up struggling for breath, cyanosed, with cold extremities and coughing up profuse frothy liquid expectoration. The lungs showed a condition of oedema. The absence of previous attacks of asthma, the existence of a cause and previous cardiac failure, the extreme distress and restlessness, cyanosis, cold extremities, profuse frothy expectoration and the

auscultatory finding of plenty of moist sounds, were the main points in the diagnosis. The differentiation is important since Adrenalin is contra-indicated in the condition, whereas it is the mainstay in the relief of the ordinary asthmatic attack.

A girl of six years who was suffering from a mild attack of ‘cold’, suddenly developed *dyspnoea* and was cyanosed and extremely distressed. Rales were heard over both sides of chest. There was mild fever. The throat was clear. Asthma could be easily excluded since the *dyspnoea* was mainly inspiratory and since the auscultatory signs were quite different. The doubt was whether there was oedema of the lungs and whether, therefore, Adrenalin was contra-indicated. There was, however a condition of spasm of the vocal cords. Adrenalin injections were given together with continuous oxygen inhalations and there was rapid relief. The case proved to be one of bronchopneumonia with spasm of the vocal cords. Diphtheria has to be thought of and carefully excluded in such cases.

Spasm of the respiratory passages is not uncommon in inflammatory conditions of the same. A medical friend was having typical asthmatic breathing and distress. The *dyspnoea* was continuous, and he had besides much cough and profuse thick mucoid expectoration and moderate fever. There was no previous history of asthma. The condition was one of acute bronchitis with spasm of the bronchial tubes. A nurse suffering from ‘cold’ developed sudden intense *dyspnoea* and was very restless and distressed; the voice was hoarse; the throat was clear, and there was no spasm of the vocal cords. It was found that tracheitis accounted for the condition.

Asthma is often complicated by chronic bronchitis, and cases of chronic bronchitis may develop asthma. History is the sole guide in distinguishing the condition.

History enables a diagnosis to be formed in tuberculosis of the lung. A history of long-continued cough, fever, expectoration, and progressive loss in weight, with or without other symptoms, points to phthisis. Of these, the chief symptom is the fever. A long-continued fever is in itself suggestive of tuberculosis, and this should be excluded before thinking of other causes like chronic *Bacillus coli* infection of the urinary tract or septic conditions in the throat or elsewhere. It must be remembered that the tuberculosis may not be in the lung, but may be elsewhere. A girl of 13 years had been having fever every day since six months, and she complained of slight pain in the right iliac region coming on after food and relieved by gentle massage. The six months’ fever indicated that she was suffering from tuberculosis, and the pain in the right iliac fossa showed the seat of the disease. The gastro-colic reflex after food initiated the pain. A diagnosis of tuberculosis of the cæcum could thus be easily made, and was confirmed by barium meal and skiagrams. There were no symptoms like cough or expectoration pointing to affection of the lungs. The mistake in thinking that tuberculosis means tuberculosis of the lung is sometimes made. In the above case, even an experienced physician made

hæmoptysis are common to all these. A healthy adult developed severe pain over the left side of the chest, he had cough and mucoid expectoration, and he ran an irregular temperature. Sputum was negative for T. B. Skiagram revealed a tumour in the lung. Dyspnœa may be a prominent symptom in tumour due to increased intra-thoracic pressure as a result of pleural effusion or enlargement of mediastinal glands, or due to pressure on trachea or bronchi. Actinomycotic infection will depend for diagnosis on the presence of the fungus in the material spat out or in the discharge from a complicating sinus in the chest wall.

General Examination of the patient should not be neglected. This alone suffices for the diagnosis of certain diseases. The appearance of an individual suffering from an asthmatic paroxysm, the characteristic facies of a pneumonic patient with the distress, rapid breathing and widening out *alæ nasi*, and the phthisical facies and emaciation in T. P. are sufficiently diagnostic. A patient in shorts and shirt, sitting up in bed, was suffering from bronchitis, but was diagnosed broncho-pneumonia by a candidate since more value was attached to the rales and rhonchi present in the lungs than to his general condition. In broncho-pneumonia, the dullness of patchy consolidation may be obscured by the compensatory emphysema and the abnormal physical signs may appear as those of bronchitis, but the general condition of the patient will show the real nature of the case.

Physical Signs are of course important. Inspection of the chest often gives much help. Flattening, retraction, fullness, or diminished movement of a side and the position of the apex beat if visible, are the points to be observed. A healthy young adult developed sudden severe dyspnœa and was restless, in extreme distress, with cold blue extremities. The apex beat was in the 5th left interspace near the midaxillary line. At first sight, it would appear as a case of acute dilatation of the heart and cardiac failure; but the right side was full and showed very little movement, showing that the condition was one of effusion into the right pleura displacing the heart. Aspiration was at once done and a large quantity of blood-stained fluid was removed. In another case, the liver was prominent, and the students concentrated their attention on the liver, trying to find out the cause of the enlargement. But a glance at the chest showed that the right side was full and not moving, pointing to effusion into the right pleura displacing the liver downward. The same features apply to any other effusion and to some extent to pneumothorax.

Alterations in vocal fremitus are of help in diagnosis, diminution or absence indicating thickening of pleura, effusion or pneumothorax. Increased V. F. should not be expected in all cases of consolidation, for there may be associated pleural thickening. Similarly, the extent, degree and nature of a diminished percussion note are of help, but there may be consolidation without obvious diminished note as when the area affected is small or as in broncho-pneumonia where the

patches of consolidation are overlapped by the compensatory emphysema. Hyper-resonance is often diagnosed not so much by the nature of the percussion note as by the fact of encroachment of the cardiac or hepatic dullness. In cases of dullness over the base and hyper-resonance above, it is advisable to shift the position of the patient to see if there is shifting in the area of dullness or resonance, indicating the co-existence of air and fluid—hydro-pneumothorax, or pyo-pneumothorax and at the same time pointing perhaps to the tuberculous nature of the case. Bronchial breathing is characteristic of consolidation but consolidation may be associated with any variety of vesicular breathing. Rales or crepitations need not be always expected in consolidation. They are of value if present, as for example, a few persistent crepitations over an apex in a suspected case of T.P., or the presence of rales side by side with fluid in the pleura, indicating co-existing affection of the lung. Pleuritic friction rub is diagnostic if present; but it is not heard in all cases of pleurisy, and the condition has to be diagnosed from the characteristic symptoms. Finally, physical signs of consolidation may be absent in pneumonia or T. P. since the area affected may be small or it may be deep-seated, and the diagnosis will then depend on the characteristic symptoms and examination of blood, sputum or in T.P., X-ray evidence.

Blood Examination is of limited value in the diagnosis of respiratory diseases. The presence or absence of leucocytosis may help in a case of pneumonia or empyema where the diagnosis is not otherwise definite. But in the rare cases of leukæmic infiltration or lymphosarcoma, blood examination is of real help. Wassermann reaction is indicated in the differential diagnosis of a gumma from a tumour of the chest.

The importance of examination of the *sputum* has already been mentioned. Microscopic examination should be done in cases of suspected T.P. wherever facilities are available, since the presence of T.B. clinches the diagnosis. It must not be forgotten that the bacilli are not present in the sputum of all cases of phthisis and so the disease cannot be excluded on this count. Repeated examination has to be done before a sputum is declared negative for T.B.

X-ray is of great value in diagnosis, but it is not indicated in all cases, and it has limitations. Its greatest use is in the diagnosis of early cases of T.P. and ascertaining the extent of the affection, and it is essential in connection with artificial pneumothorax therapy and in the diagnosis of tumours of the chest. It is also of use in demonstrating X-ray appearance of gross abnormalities like cavities, pleural effusions and fibrosis. It helps also in checking the results of treatment. Some of us often send cases of suspected or obvious phthisis to the X-ray department for a diagnosis without a proper examination. A medical student who got a cough, went to the X-ray department and had a skiagram taken suspecting T.P. He did not think of consulting a physician in the first instance. Without having a look at the skiagram, he was told that the skiagram might show both hila

positive with some fibrosis extending to the right base. He was surprised since that was the report and his worry was set at rest only when he was told that such appearances could normally be expected in city dwellers and carried little significance. X-ray appearances have to be judged in conjunction with the clinical characteristics. It is superfluous to order a skiagram in an advanced case of tuberculosis, since it is not required for diagnosis, prognosis or treatment and it is often unnecessary in gross pleural effusions.

Exploration is a simple procedure, and in a suspected case of pleural effusion, it not only confirms the existence or otherwise of fluid, but shows also the nature of the fluid. A clear serous fluid may be that of a sero-fibrinous pleurisy or of hydrothorax. The nature of a purulent fluid indicates also the cause of the empyema. A blood-stained fluid is usually taken as evidence of malignant disease of the lung, but it may be due to a tubercular pleurisy. Malignant tumours, however, often show only clear fluid. In a case of lympho-sarcoma of the chest, the fluid was clear, but examination revealed the characteristic cells. Microscopic examination of the fluid, culture and guinea-pig inoculation are of value in obscure cases.

1940]

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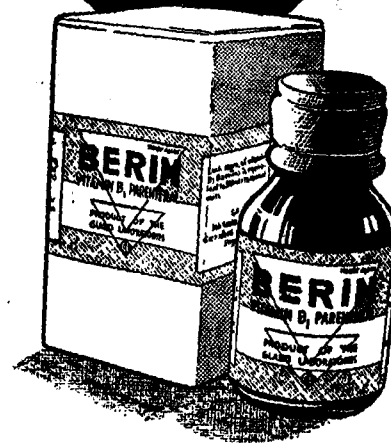
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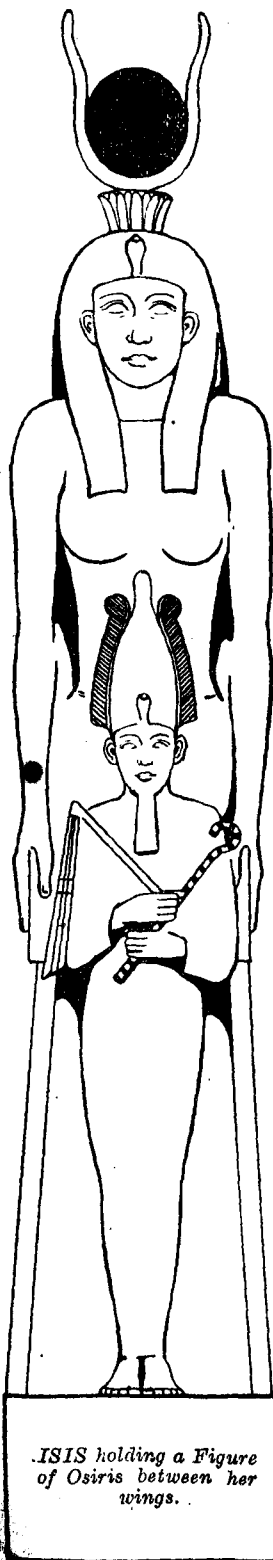
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M 286

Pulmonary Manifestations of Some Common Extra Pulmonary Diseases

BY

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King George Hospital, Vizagapatam.

IN this issue which is devoted to Respiratory Diseases, it is not out of place to discuss some common extra-pulmonary conditions that can give rise to signs and symptoms closely simulating those of pulmonary disease. Such an attempt, it is hoped, will complement the picture and will be of considerable assistance in differential diagnosis.

Cardiac Conditions.—The paroxysmal dyspnoea of left ventricular failure may be nocturnal and in its onset and manifestations, it may so closely simulate the very common bronchial asthma; and as its treatment is different from that of asthma, its diagnosis is of paramount importance. The patient who is a subject of hypertension, renal disease, aortic valvular disease or aneurysm or of pericarditis, may be awakened from his sleep near about the midnight in a fit of air hunger, sits in his bed and gasps for his breath, a picture not very unlike that of bronchial asthma. The left ventricle which is more tired out than the right, is unable to recover its tone, as well as the right ventricle, resulting in an asynchronous output of the two ventricles leading to a stasis in the pulmonary vascular bed behind the left ventricle. This vascular stasis into the alveoli leads to an encroachment on the vital capacity of the lung, deficient oxygenation of the blood, and the consequent dyspnoea. On physical examination of the lungs alone, one recognises plenty of moist sounds due to the oedematous exudation into the alveoli and can be easily mistaken for the adventitious sounds heard in bronchial asthma. But even a cursory examination of the heart and the blood pressure should save one from such a diagnostic pitfall. In the treatment of this left ventricular failure, Adrenalin Hydrochloride, the commonest drug that one usually uses for the relief of bronchial asthma, is perhaps one of the worst and the most dangerous that can be administered, in as much as it raises the peripheral resistance by vaso-constriction and will certainly act as a load on a fatigued heart. The ideal drug for administration is Morphia and its allies, which give the necessary rest and lead to the recovery of the ventricle. Regarding the prognosis of this condition, it is not often that an attack will dramatically result in certain death before any medical aid could be summoned; but a judicious examination and a prompt and proper treatment in these cases, may save the patient from an imminent fatality.

The fact that hæmoptysis occurs in sixty to eighty per cent of cases of pulmonary tuberculosis, at one stage or another, has led many an unwary and even an experienced physician to stamp certain cases

unnecessarily as pulmonary tuberculosis when the focus of the disease is entirely extra pulmonary. The following is an illustrative case :

A girl aged sixteen years, suffering from fever and cough and hæmoptysis of two months' duration, was diagnosed as a case of pulmonary tuberculosis both on clinical and radiological grounds. The hæmoptysis, the moist sounds heard on auscultation in both the lungs and associated fever and cough, gave the impression that the case was one of pulmonary tuberculosis and the congestive appearance of the lungs on X-ray confirmed it. The sputum, however, was negative for tubercle bacilli on repeated examinations. The association of mild joint pains and the development of a thrill and a murmur ultimately led to the revision of the diagnosis as rheumatic carditis with pulmonary stenosis.

The commencing failure of cardiac reserve leading ultimately to a typical congestive failure secondary to bronchial asthma, emphysema, valvular disease, hypertension, myocarditis or renal disease, may manifest itself as a chronic cough showing few crepitations at the bases and may be easily mistaken for a chronic bronchitis but it is to be recognised that the myocardium is the one that is calling for treatment.

Coronary thrombosis is an important condition that has come to the forefront during recent years. Though a typical case has a textbook description, its manifestations are so protean that it is not unlikely to be mistaken for a lung condition. Acute pain in the chest associated with basal congestion and dyspnoea, and very soon developing some temperature with a blood picture showing leucocytosis, may be easily mistaken for pneumonia. Morphia is the sheet anchor of treatment in coronary thrombosis and a mistake in the diagnosis may lead to the withholding of the drug which may be disastrous. The absence of bronchial breathing, the mild onset of temperature, the cardiac symptoms and signs and the fall in the blood pressure, are the important differentiating signs which will assist in the diagnosis of this condition. An electro-cardiogram, if available, is invaluable.

Intra-Thoracic Tumours.—An enlarged thymus in the new born, hyperplasia of the mediastinal gland, either primary or secondary, a substernal thyroid and above all aneurysms in connection with the aorta, can give rise to a variety of symptoms which can simulate pulmonary conditions and can only be differentiated by a careful clinical and radiological examination.

Mild or profuse bleeding, intermittent or continuous for weeks or months, may be due to a leaking aneurysm of the arch of the aorta. This hæmoptysis may be associated with paroxysmal, brazen, ringing wheezy cough frequently with expectoration and associated with a husky or weak voice and in this combination of symptoms, the case may be easily mistaken for pulmonary tuberculosis.

All intra-thoracic tumours including aneurysms may press upon the trachea or the bronchi, giving rise to a dyspnoea which is essentially inspiratory in character, and which is associated with few or no

adventitious sounds in the lungs. Occasionally, a complete compression of a bronchus may give rise to a partial or complete collapse of the lung with its typical signs and symptoms. The primary condition has to be carefully evaluated and suitable treatment adopted.

Conditions of the Throat, Larynx and Bronchi.—Productive or unproductive cough is one of the earliest symptoms of a pulmonary condition. The pharyngeal cough of a chronic smoker or a drinker, an elongated uvula, a chronic recurring tonsillitis, are among the very frequent sources of error, which can be easily ruled out by a routine examination of the throat in all cases. It is to be remembered by every clinician that these simple conditions may easily camouflage more serious conditions deeper in the throat, which can only be revealed by an appeal to a throat specialist as the following case illustrates :

Male, aged 54 years, who was a heavy smoker, complained of cough and slight alteration in the voice of three months' duration. Though a routine examination of the throat showed a mere congestion, a detailed laryngoscopy revealed a small cancerous growth in the vicinity of the vocal cords. The case proved fatal within six months of the diagnosis.

Diphtheritic infections which are supposed to be very uncommon in the tropics have been shown to be not at all rare in our own clinic. There have been diphtheritic infections of every variety and there have been epidemics of pharyngeal and laryngeal diphtheria in this clinic, and its occurrence in our midst is of such doubtless significance, that a careful examination of the throat must take precedence over all other examinations in the case of infants and children. The respiratory obstructions, with or without cyanosis, the mild pyrexia and the intense toxæmia, with or without convulsions, may easily simulate infections of the lung. In children, it is not uncommon that the signs and symptoms of pneumonia are not atypical and the omission of a careful examination of the throat may result in the overlooking of a pharyngeal or laryngeal diphtheria, in which a prompt treatment may mean a difference between life and death.

A retropharyngeal abscess may give rise to noisy dyspnoea, often spasmodic, the difficulty being particularly present in the inspiratory phase. It is invariably associated with pain, a symptom which in the adult is of leading significance, but in the inexpressive infant and the child, fails in its role and may mislead the clinician. A digital examination of the throat is important and will reveal a retro-pharyngeal swelling which is responsible for the signs and symptoms.

An attack of dyspnoea, which sets in suddenly and increases in intensity within an hour or two, the condition becoming very critical, is characteristic of oedema of the glottis. Here again, the dyspnoea is of the inspiratory type. The voice soon becomes husky until the patient is completely aphonic. Examination of the throat shows an enormous swelling of the epiglottis. This may be due to inflammatory conditions of the larynx, throat and neck or to angio-neurotic oedema

or in generalised œdema secondary to other diseases—particularly in acute nephritis in which it may be particularly anticipated.

Foreign bodies in the trachea and bronchi in children are another source of acute or chronic dyspnoea and should be borne in mind. Besides, there are a few rare conditions like the lingual varix, vicarious menstruation and various other ulcers and new growths of the larynx that can give rise to a smart hæmoptysis.

Effusions of the Pleura and Pericardium.—Hydrothorax or pleural effusion, either primary or secondary, can be responsible for an acute or chronic respiratory distress. If there is superimposed pyrexia, it is not unlikely to be mistaken for acute inflammatory conditions of the lungs. The signs and symptoms of fluid in the pleural cavity are well known, but it is to be emphasised that they are likely to be overlooked in cardiac and renal cases, when fluid accumulates insidiously. A roentgenological examination, supported if necessary by a diagnostic puncture, is indicated in all suspicious cases and the drainage of the fluid will considerably alleviate suffering and will substantially assist in the treatment of the primary condition. Pleural effusions, which are supposed to be terminal, may be missed when the patient is alive and may come to light only on post-mortem as the following case illustrates.

A, hypertensive, aged 40 years, came in for successive attacks of cardiac failure. His liver was enlarged and he had œdema of the legs and fluid in the abdomen and was extremely dyspnoic. His urine showed moderate amounts of albumin and contained granular casts but his blood urea was within normal limits. Digitalisation showed no improvement and his œdema and dyspnoea persisted and the patient died. On post-mortem, it was found the kidneys were moderately contracted, the heart hypertrophied and the liver enlarged and congested. The left lung was the seat of pulmonary infection, probably healed tuberculosis, with numerous adhesions to the pleura while the right lung was healthy but was compressed by a pleural effusion which substantially interfered with its expansion. The extreme respiratory embarrassment and the failure to digitalise must have been due to this effusion, and attention to it might have probably postponed the fatal termination.

Cough associated with dyspnoea and even cyanosis is a common and important symptom which is characteristic of pericarditis with effusion.

Toxic and Blood Conditions.—The dyspnoea of uræmia may be continuous or paroxysmal or alternating. It is frequently nocturnal and the patient may sit up and gasp for breath and may be in such distress as in true asthma. The Cheyne Stokes type of breathing may persist for weeks or months. Uræmia is often missed, because its varying signs are not borne in mind. An examination of urine, previous history of nephritis, the existence of high blood pressure and

other cardio-vascular changes including a biochemical examination of the blood should obviate such a mistake.

The first indications of acidosis of diabetes may set in with an acynotic dyspnoea with loud deep inspirations and expirations known as air hunger of KUSSMAUL. This dyspnoic attack may come on without any premonitory symptoms and the patient may be awakened from sleep.

Besides, a host of blood conditions including the primary and secondary anæmias and leukæmias in which dyspnoea on exertion is a predominant symptom, have to be carefully investigated.

Secondary Bronchitis.—Bronchitis, either secondary or as premonitory sign, can always occur in the course of such infections as typhoid, measles, relapsing fever and other acute infections, and should never be given precedence over a probable primary condition.

In children, pulmonary ascariasis has to be borne in mind. The pulmonary condition is due to the elaboration of the ascarial infestation through the pulmonary bed. An examination of the motion will settle the diagnosis and an efficient de-wormisation will cure the condition.

Sub-Diaphragmatic Conditions.—An amœbic abscess of the liver with its pyrexia may be associated with dullness and signs of congestion at the base of the right lung and may be easily mistaken for a pulmonary condition if the history of amœbic infection is not forthcoming or if the liver is not definitely palpable or its tenderness and enlargement has suffered noticeably. When there is extension of the abscess of the liver into the lung with evacuation of pus through the bronchi, the condition can even more probably be mistaken for some grave pulmonary infection. The diagnosis of the amœbic infection is very important in these cases, as the specific action of Emetine is highly curative.

A sub-diaphragmatic abscess may also give rise to signs and symptoms which may be mistaken for those of pulmonary infections, particularly acute pneumonia. But a careful examination of the abdomen should be of considerable assistance in diagnosis.

Acute pancreatitis associated with cyanosis and extreme shock, is an abdominal catastrophe of the first magnitude, and though on account of its high mortality its diagnosis is more of academic than of practical importance, it is not often that such cases may be passed off as acute pulmonary infections.

Conclusion.—In conclusion, the author wishes to state that this article is not an attempt to exhaust all the extra pulmonary conditions that can give rise to the cardinal signs and symptoms of pulmonary disease; for, almost a few volumes could be filled in such an attempt. Only a few of the important extra-pulmonary conditions that may be confounded with some of the frequently occurring pulmonary conditions are dealt with, considering the value of this Journal to the general practitioner.

Some Causes of Respiratory Distress and their Treatment

BY

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IN this short article, I propose to look at one of the most obvious symptoms of respiratory distress and to point out some of the common causes.

When we are faced with a patient in our practice, we have to work from symptoms to a diagnosis, a fact that many of the text-books forget. I have chosen the symptom, "difficulty in breathing," as it must be the most common referable to the respiratory tract and we will look at some causes and lines of treatment. It is a symptom that is relatively more often met with in children and in them gives rise to more doubts in diagnosis.

Causes of respiratory difficulty may be classified according to the site of the lesion. The cause may lie in the upper respiratory tract or in the lungs themselves. There are a few central nervous causes or it may be a disorder of the cardio-vascular system.

Foreign Bodies in the upper respiratory tract will cause some degree of respiratory distress and in children, this may be a very marked feature. A foreign body in the larynx is readily diagnosed on account of the extreme discomfort to the patient who is coughing, choking, unable to speak, and comes pointing to the pain at the site of the trouble. The history, either of the patient or a relative, usually makes the diagnosis definite, and removal of the foreign body must be attempted immediately, preferably with a direct laryngoscope. If this is found to be difficult or impossible, then a tracheotomy may be essential and the foreign body removed later, when the danger to life is passed.

If a foreign body has been inhaled, passed the larynx and is lodged in the trachea or bronchus, the treatment is not so urgent, and after a careful investigation with X-ray, arrangements can be made for its removal with a bronchoscope. There is not the same degree of respiratory distress in such a condition.

Acute Retropharyngeal Abscess usually gives rise to a fairly marked difficulty of breathing and this again is more marked in children. In fact, it is usually the leading symptom.

Acute retro-pharyngeal abscess is usually a sequel to an acute tonsillitis. In children, an acute sore throat may be overlooked, for it is often the case that children do not complain when they have a throat infection. The difficulty in breathing is mainly a mechanical one due to the size of the abscess or due to oedema of the glottis, which is part of the general swelling and concurrent inflammation of

the larynx. Earlier symptoms may be a croupy cough, and some limitation of the movement of the neck.

When the diagnosis has been definitely made, the abscess should be opened by a vertical incision with a knife, or if on the point of bursting, then with a pair of sinus forceps. A general anaesthesia has the disadvantages of allowing the possible inhalation of the pus and, if the operation is done rapidly and decisively, the amount of pain caused is very little, and no anaesthetic is necessary. When drainage is adequate, then the condition as a rule heals rapidly.

Croup is a periodic condition that is met with in young children due to a sudden spasmodic closure of the glottis. It has a typical symptomatology, and does not appear to be common in South India, probably on account of the moist warm atmosphere that we experience especially in Travancore. Although not very serious, it has an alarming degree of respiratory distress, and the parents of the child are naturally most anxious. As the child grows older, the attacks become less and less frequent, and after two or three years of age, it is seldom seen. It is more common in boys. The diagnosis is usually not difficult on account of the typical inspiratory croup and absence of any marked generalized upset. It must, however, be distinguished from faucial or laryngeal diphtheria, which will be considered next. In true croup, there is no inflammatory lesion in the throat or larynx.

The treatment consists of steam inhalations and anti-spasmodics during the attack, and general health measures with plenty of open air for the intervals.

Another primary upper respiratory tract disease that will give rise to respiratory distress, is faucial and more markedly, laryngeal diphtheria. This condition, which is common in Britain, I have not seen often in South India. However, sporadic cases do occur, and one must be on one's guard not to miss them.

In any child that has fever and toxæmia, an examination of the throat should always be made, and to allay any fear and distrust on the part of the child, it ought to be the last examination. The diagnosis is of course aided by the bacteriological finding of diphtheria bacilli, but the ultimate diagnosis lies with the clinician and the bacteriologist cannot say more than that he finds bacteria morphologically similar to the *Bacillus Diphtheræ*.

Respiratory distress is most marked and may be extreme in the laryngeal disease. It is usually an extension of the faucial type, and a typical membrane may be seen on examination of the throat.

In treatment, the most important thing is early and adequate dosage of antitoxin and tracheotomy, when the amount of distress makes it imperative.

Passing next to diseases of the *pleura* and *pleural space*, we again find that there may be considerable respiratory distress caused by them.

A Simple Pleurisy by its pain during the respiratory movement, causes the patient to have difficulty in breathing, and although pain is the usual complaint, the resultant difficulty is also usually complained about.

More common is the patient who comes complaining of respiratory difficulty and there may be some slight pain or dullness in one side of the chest, and on examination is found to have a large *effusion* into the pleural space. It is often surprising how such a patient has not complained during any acute phase of the disease, and even more inexplicable is the case that comes with a large *empyæma*, with a history of two or even three months.

In these cases, the respiratory difficulty is due to mechanical obliteration of part of one lung by fluid or pus, and diagnosis is definite after a careful examination and diagnostic puncture of the pleural space.

In the treatment of these conditions, removal of pus is essential, and can be done either by repeated aspiration or more effectively by closed drainage, preferably with some continuous suction.

In simple non-suppurative effusions, removal by aspiration is also a necessary part of treatment, especially when the respiratory difficulty is marked. Replacement by some air is a help in order not to reduce the pressure too suddenly. The main difficulty is the continual recurrence of the fluid, and an intra-pleural injection of Neptal or Mersalyl may aid the excretion of the fluid. Many simple effusions are of tubercular origin and, therefore, need vigorous general measures as well.

In the acute diseases of lungs, there is usually some respiratory difficulty.

In **Pneumonia** it is always a symptom, and its severity depends on the amount of lung involved. As I do not intend to discuss pneumonia in detail, I would like only to stress the use of the blood pressure reading as an aid to prognosis. Many cases of pneumonia die of toxæmia of the vaso-motor centre. The prognosis is definitely worse in a case where the blood pressure is low and becoming increasingly so, and the most effective remedy for this I have found to be the injection three or four hourly of $\frac{1}{2}$ c.c. Pituitrin.

In **Acute Bronchitis** there is also a degree of respiratory distress, but it is not a leading symptom unless the patient is an old bronchitic with *empyæma*. There is little that is specific in these cases, and consequently legion are the cures reputed for it.

There is also one other acute respiratory disease that we see with a varying etiological factor and that is, acute pulmonary oedema.

There were a series of cases that we saw in post-malarial generalised anasarca, and one in particular was extremely dyspnoic, and made a remarkable recovery on four hourly injections of Atropine gr. 1/100 combined with some Morphia.

The more common type is the post-operative acute pulmonary oedema, and here again the response to Atropine injections may be very marked.

One must not leave unmentioned the group of cases where respiratory distress is due to cardiac disease.

Dyspnoea is one of the essential symptoms of cardiac disease and it occurs mainly in advanced valvular and myocardial cases. Early non-progressive valvular disease may not give rise to much dyspnoea except on exertion, and "exertion dyspnoea" is characteristic of cardio-vascular disease. Except in the terminal stage of valvular errors, the most marked dyspnoea may be seen in hypertensive heart failure, or as it is sometimes termed, uræmic asthma, although the cause is probably myocardial failure from long-standing overwork rather than the actual retention of nitrogenous waste material.

Complete rest is the most effective remedy in all such conditions and added to this, Digitalis for the arrhythmias and tachycardias and venesection in the cyanosed and hypertensive cases. Blood letting may have a most beneficial effect in dyspnoic hypertensive heart failure, but is only a temporary relief.

The condition of "*effort dyspnoea*" met with in young adults, where no very definite organic heart lesion is demonstrable, is often a puzzling one to the doctor. One may immediately say "neurasthenia" and make little attempt to treat the case. One sees, especially among young students, cases who come complaining of respiratory difficulty on little exertion and in consequence of this, have stopped all forms of exercise. First, one must satisfy oneself that there is no organic lesion of the heart, and that the patient has no other disease. Secondly, that there are no foci of infection, and thereafter a reassurance and gradual encouragement to return to normal exercise will in most cases effect a cure.

Severe *anæmia* may also give rise to dyspnoea, due of course to the lack of oxygen carrying ability of the blood. A blood picture with a very low hæmoglobin content is common in areas where hookworm is prevalent, and the amount of dyspnoea in these cases may be marked but the diagnosis is usually easily made and treatment is treatment of the cause of the *anæmia*, combined with some assimilable type of iron—the best for general use being undoubtedly Ferri et Ammon. Cit. When iron is given, it must be given in adequate doses and at least half a drachm of Ferri et Ammon. Cit. should be given, three times daily.

Before concluding, I would like to mention two possible central or nervous causes of respiratory distress.

First: disease of the medulla involving the respiratory centre gives rise to a typical symptomatology which is fortunately of rare occurrence.

It was my unfortunate lot to see two cases of *acute polioencephalitis* involving the medulla in the same family and occurring in the same

week. They both of course showed typical signs of bulbar paralysis, and the first symptom, and the most marked, was difficulty and inability to swallow, passing on in forty-eight hours. Along with this, developed a difficulty in breathing, ending with complete respiratory failure. The first case was seen only half an hour before death, with a history of a fever for two days and "something wrong with the throat". She was found to have temperature of 102° and a rapid pulse. On examination of the throat, there was found a great quantity of very frothy mucus collected there, because she was unable even to swallow her saliva properly. Suddenly, as she was being examined, the breathing ceased, and she became deeply cyanosed. In spite of artificial respiration, and all types of stimulants, and even a tracheotomy, nothing was of any avail and the child died within half an hour. The brother of the child went down with fever three days later, and, in forty-eight hours, had developed the same extraordinary frothing in the back of the throat, due to the expiratory air bubbling through saliva which the child could not swallow. He also died the following day of acute respiratory distress ending in complete cessation. On this case, a post-mortem revealed definite microscopic evidence of poliomyelitis of medulla including respiratory centre.

I hope, I will never be so unfortunate as to see such a case again, as even now, knowing the exact pathology, it is doubtful if any treatment would have been of much use. Serum from convalescent cases of poliomyelitis and the "iron lung" seem to be the only possible remedies.

This latter reminds me to mention the other central nervous cause of respiratory distress, that of *poliomyelitis* which involves the muscles of respiration. This is of course "par excellence" the disease in which a respirator is of use. The respirator will tide the patient over the period of respiratory paralysis, if and until the muscles of respiration recover, and the important thing is to know where the nearest Nuffield respirator is and to get the case into it as soon as possible. The findings in the cerebro-spinal fluid are an aid in early diagnosis of infantile paralysis. The typical picture is an increase of cells up to 100 per cm. with very little other change.

Pitfalls in Diagnosis of Respiratory Diseases

BY

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THE diagnosis of respiratory diseases is full of pitfalls. Every clinician has his own experiences about the mistakes he has made or he has seen made in the diagnosis of respiratory troubles. In the following few lines, I wish to relate some of these. I hope that my humble remarks will be taken in proper light.

Errors in diagnosis of respiratory diseases fall mainly under two categories. A respiratory trouble may be diagnosed when there is none and such a trouble may be missed when there is one. Again, there may be errors in the diagnosis of various diseases of the respiratory system.

Cough with hæmoptysis is a syndrome which appears *prima facie* to be one indicating respiratory trouble, *viz.*, pulmonary tuberculosis, bronchiectasis, etc. But with little clinical experience, one begins to look for things outside the system. A case of mitral stenosis, with congestion of the lungs presents a similar picture. A passing attention to the heart with its presystolic or diastolic murmur and a thrill, will make the diagnosis clear. Here, it is necessary to add that sometimes it may be difficult to feel a thrill or hear a murmur. The difficulty of the latter is because it is heard in a limited area and so is likely to be missed. Such a murmur is best heard in the lying position on the outer side of the apex beat, particularly when the patient is turned a little on his or her left side. The murmur may also be made more prominent by exercising the patient a little, *e.g.*, rising up and lying back in bed for about six times, if patient is not too bad for it.

Aneurysm of the aorta, leaking in the bronchus, gives rise to a similar syndrome. Throbbing pain in the chest is usually present but the condition may be without any symptoms. A radiogram of the chest always proves to be of great help in coming to a diagnosis.

Failure of the left ventricle may cause cough with blood-tinged frothy sputum.

Though 'cough' sounds more like a symptom of respiratory disease, it has important non-respiratory causes as well. An advanced case of pernicious anæmia had marked dyspnoea and cough. A blood transfusion immediately improved the dyspnoea but the cough was unaffected. The cough was probably due to reflex irritation of the vagus (or phrenic) by a dilated left auricle. A reflex cough is often due to tympanites which is common in children, to dilatation of the stomach or to intestinal irritation by worms.

A child of 7 years had bad cough for a few months. There were no physical signs in the lungs. X-ray examination revealed a big mass of enlarged tracheo-bronchial glands, which, perhaps, was responsible for the cough reflexly. It is not uncommon to see a cough relieved by removing wax from the ear. Aneurysm of the arch of the aorta

should always be remembered as an important cause of dry cough. The cough is said to be peculiar in its character and is called 'gander cough'.

As a tip to diagnosis, it may be said that when the cough is dry, *i.e.*, without expectoration, a reflex cause should be looked for. A bout of cough, coming on specially after some exertion, is probably due to cardiac trouble.

'Dyspnoea' is an important cardio-respiratory symptom which appears in a number of disorders outside both the systems. A middle aged lady suddenly became greatly dyspnoeic with an accelerated respiratory rate of about 42 per minute. Lungs and heart were found to be normal by physical examination. Urine was examined and found to contain 7% sugar with marked positive tests for Acetone and Diacetic Acid. Ketosis was diagnosed and the condition was relieved by vigorous suitable treatment. In this case, the respiratory condition was one more of hyperpnoea than dyspnoea. Such a condition is sometimes due to uræmia and estimation of urea in blood, may be necessary to come to a diagnosis. Allergy and eventration of diaphragm should also be remembered as rare causes of dyspnoea.

In one case, dyspnoea was due to a sub-diaphragmatic abscess. Right dome of the diaphragm was raised almost to the third rib. It was difficult to come to a diagnosis, between pyo-pneumothorax and sub-diaphragmatic abscess, even after an X-ray picture. It was possible to do so only after exploration with a needle, when foul smelling pus was aspirated.

An apical pneumonia is likely to be missed as will be seen from the following case. A middle-aged male had high temperature and delirium. Physical examination revealed nothing notable in any system. As a routine, a blood smear and urine were taken for examination. Blood smear showed 86% polymorphs and no parasites. Urine showed marked diminution of chlorides. A probable diagnosis of pneumonia was made. Next day, the patient ran to my room complaining of imaginary persecution at the hands of his relations. He was soon followed by his relations and family doctor. The patient had high temperature and was much excited. After quieting him down a little by assurances, he was amenable to a proposal to screen him there by X-rays. Screening showed consolidation of right upper lobe. He was immediately put on M. & B. 693 and he made an uneventful recovery.

It is not uncommon to see cases of pulmonary tuberculosis treated as malaria or typhoid and even as pneumonia. If an intermittent fever, thought to be malarial, does not respond to specific malarial treatment within a week, infection by *B. tuberculosis* should be suspected, however improbable it may appear. One should not wait for physical signs to appear in the chest, for, by that time the disease becomes far advanced. At present, radiography takes the lead in early diagnosis of pulmonary tuberculosis and physical signs are last in the field.

It must be realized that an acute broncho-pneumonic type of pulmonary tuberculosis occurs in which there is high temperature between 102–104° F. throughout its course of 4 to 10 weeks. Such cases are mistaken for typhoid fever complicated by hypostatic pneumonia or broncho-pneumonia. Repeated negative Widal Reaction will first bring the diagnosis of typhoid in question. Repeated sputum examinations will reveal tubercle bacilli and the true nature of the disease. There is also a condition like tuberculous pneumonia, which is characterized by acute pneumonic consolidation involving an entire lobe or lung, similar in appearance to lobar pneumonia of pneumococcal origin and indistinguishable from it in the early stage. Tubercle bacilli are usually absent from the sputum at this time. As the disease progresses long beyond the time for crisis, suspicion is aroused as to its tuberculous nature. Within twelve weeks, cavity formation occurs in the consolidated area and then tubercle bacilli may be demonstrable in the sputum. Cases of incipient pulmonary tuberculosis are also often mistaken for disorders of gastro-intestinal tract, unless it is known that the gastro-intestinal disturbance is one of the early symptoms of the former malady.

Gross mistakes may be made in the differential diagnosis of various respiratory troubles. These mainly result from scant attention to the history and more particularly to the sequence of events in the history of a case. I do not propose to deal with these in this short paper; but before closing, I will mention a case in which consideration of the history of illness alone gave clue to the correct diagnosis.

A workman aged about 58, had hæmoptysis and evening rise of temperature for about two months. He was admitted to a London hospital, where he was diagnosed as pulmonary tuberculosis with fibrosis of the right upper lobe. Physical examination disclosed marked dullness and absence of breath sounds at the right apex. Sputum examination was negative for *B. tuberculosis* and sedimentation rate was increased. X-ray examination was not done as the physician firmly believed the case to be of pulmonary tuberculosis with fibrosis. The patient was doing his usual work two months back and did not have any prolonged illness as far as he could remember. To me, the short history of the illness appeared to be incompatible with such an extensive fibrosis as denoted by the physical signs. The fact that he never had any prolonged illness before, gave support to my doubt. So, I attributed the dullness and absence of breath sounds over the right upper lobe to its collapse resulting from obstruction to that branch of the bronchus and presented the case for discussion as a case of malignant neoplasm of the right upper lobe of the lung. The findings so far were equally favourable for both the diagnosis. So, further investigation of the case with X-ray examination and bronchoscopy was decided upon. As a result of the examinations, the clinical diagnosis of malignant neoplasm of the lung was confirmed.

Auscultation in Respiratory Diseases*

BY

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General.—Auscultation is the most important method of physical examination in diseases of the heart and the respiratory system. It is a simple method and does not need any complicate mechanical equipment. Moreover, intelligently applied, it enables the practitioner to make a fairly accurate diagnosis in the majority of cases.

Unfortunately, this simple and accurate method is losing favour with physicians of the present day, and is being gradually superseded by the more complex and elaborate techniques like the Röntgen rays and the microscope etc. Not only is this evident in large cities, but the attitude has permeated into the country as well, though there is but little facility for the routine application of these accessory aids. As a result, the fascinating art of auscultation has degenerated into a mere ritual.

One of the main causes of decline in popularity, not of auscultation alone, but of other methods of physical examination as well, is the modern system of medical instruction, which assigns far greater value to the skiagram or the sputum-examination report. Instances have been recorded of surgeons proceeding "to operate on cases not previously examined.....sometimes not even previously seen, but accepted on a diagnosis made in the X-ray room or elsewhere."¹

It is the highly scientific nature of these methods that is held responsible. Moreover, the time required by the clinician to arrive at a correct diagnosis with these aids is very much less than that required by the more laborious and painstaking methods of physical examination. To the clinical teacher, who is often a physician with considerable professional practice, this is an additional gain, in as much as, he is freed from his tutorial duties to devote more time and attention to his patients, who, after all, form the mainstay of his successful material existence. The nett result has been a neglectful attitude towards the methods of physical examination and a "decline in the standard of clinical teaching."¹ Being the most important method and requiring the greatest care and experience, auscultation has been vitally affected, by this disparaging attitude, so much so, students, the future practitioners, have come to regard the stethoscope, which was once described as capable of converting the "ear into the eye",² as a "museum specimen"³ only.

Long before the invention of the stethoscope, auscultation was

* Read at a Clinical Meeting of the Barisal Branch of the Indian Medical Association on 13-7-40.

an approved method of examination in chest diseases. The "immediate" method was universally applied, and it is said⁴ that Hippocrates could differentiate pus from "water" inside the chest in this way. He was also aware of rales and friction sounds, but the significance of auscultatory phenomena was seldom realised in those days. HORNE TOOKE first suggested in the 17th century that one could be able to tell whether the "engines within were going properly or not".¹ It was left to a Frenchman, LÆNNEC, to prove TOOKE's contention two centuries later.

While listening to a patient's chest, he rolled a piece of paper into a tube and found that he could hear better through it than by the prevalent immediate method. This led to the invention of the stethoscope (from stethos=breast and skopein=to see) in 1819, and the introduction of the "mediate" method of auscultation into medical practice. The thoroughness with which LÆNNEC used it in diseases of the lungs, in which he was infallible, may be appreciated if it is realised that very little has been added to his observations in these long years. His "Treatise on Mediate Auscultation and the Use of the Stethoscope" is still a recognised authoritative handbook; which may be studied with advantage by the general practitioner of to-day.²

Writing about auscultation, LÆNNEC's contemporary, DR. WILLIAM STOKES, observed that "the introduction of auscultation and its subsidiary physical signs has been one of the greatest boons ever conferred by the genius of man on the world".² ADDISON went a step further and remarked that, "LÆNNEC contributed more towards the advancement of the Medical art than any single individual, either of ancient or modern times."² It was a great discovery and LÆNNEC may be regarded as one of the greatest personalities in medicine for all ages.

Both the mediate and immediate methods have their uses, but the latter has been, more or less, abandoned for various reasons, e.g. decency, cleanliness etc. In this country, it was never very popular, the climatic and social factors having influenced it to no small extent. LÆNNEC's original stethoscope consisted of "one wooden tube, about 10 inches long, 4 inches in diameter, with a central canal and an obturator at the chest end."⁴ It was used with one ear only.

Gradually, it has developed into the present-day binaural one with rubber-tube connections between the chest and the ear-pieces. The former has undergone various modifications from time to time and any number of varieties are now available in the market. Recently, JHONSTONE and KLINE⁵ (1940) investigated the acoustic properties of twenty-four different types of chest-pieces and six kinds of rubber-tubing of varying lengths and thicknesses, and arrived at the following conclusions, which, though not conclusive, are interesting. They found that bells with a diameter of 3 inches and an air-chamber of 3.5 m.m. in depth covered by a sheath of rubber, gave quite good results for ordinary purposes. As regards the length of the rubber-tubing, their observations were more or less contrary to the prevalent

view. Long tubes did not materially affect the conduction of sounds, except of the high-frequency notes. They found it advantageous to have a tube with small bore 3.5. m.m. in diameter, the same as that of the passage from the bell to the air-chamber of the chest piece. The stiffness of rubber was immaterial.

Whatever the type of the stethoscope, the cardinal point to be borne in mind is that the physician must be well-adapted to a particular one and must be able to interpret the sounds in thier true relations, distinguishing the unimportant from the important and relevant ones, e.g. crackling of hairs on the chest from crepitations etc. Further, details of technique, like placing the chest piece flatly and without any tilt, or preventing the tube from kinking or rubbing against each other or against the clothing etc., must be carefully observed. I have direct knowledge of incidents, like blocking of the lumen of tubes by insects, or their rupture at the joints, leading to gross misinterpretation of conditions actually existing underneath.

One of the commonest mistakes that the beginner is often liable to make, is the failure to evaluate differences in auscultatory signs, which normally exist in the two sides of the chest. Further, the beginner, frequently the busy practitioners as well, is often in the habit of moving the chest piece rapidly over different parts of the chest, "not hearing as much as one should."⁶ It has been found by experience that patients, especially the ill-educated ones of this country, often do not know to breathe adequately for successful auscultation. Usually, a deep breath is needed, but, asked to take a deep breath, they take a deep inspiration and withhold it, or breathe out forcibly with a noise. Some, on the contrary, start to breathe hurriedly as if panting for breath. Obviously, the findings of rapid auscultation in these patients are hardly of any consequence and are fruitful sources of error.

Accurate auscultation requires scrupulous regard for the technical niceties of the art, and thorough grasp of the fundamental principles of normal and abnormal auscultatory phenomena and fallacies associated with both. Moreover, systematic examination of the different items e.g. R.M., V.R. etc. has to be made. Successful appraisal of underlying conditions depends not on the finding of abnormality in one item, but on the combined and corroborative findings of all the items.

Physiological Principles.—In auscultation in respiratory diseases, we observe the,

1. Condition of the breath-sound or respiratory murmur.
2. Condition of the voice-sound or vocal resonance.
3. Presence or absence of sounds, correlated or not, to the breath sound.

1. *The Breath-Sound or Respiratory Murmur*:—BEAU⁷ stated in 1834, that the vibration of the vocal cords due to the passage of air, was the cause of the sound, while SAVILLE⁸ held that it was caused by

the air "entering or leaving the air vesicles." Recently, ORNSTIEN and ULMAR suggested that the breath-sound was mainly produced by disturbance set up in the bronchial-tree "whenever the in-rushing column of air strikes the sharp edge of the bifurcating bronchus." They also found evidence of production of sound in the alveoli as well.

In the bronchi, the sound produced is of a higher pitch (1000-2000 cycles per second) than that heard in auscultation. This has been explained by assuming a "selective-transmitter" property of the lung-parenchyma, which modifies the bronchial sound by transmitting only a small range of vibrations (with an optimum between 200-450 cycles per second) and suppressing all higher and lower ones.

Moreover, the alveolar-sounds also contribute to the diminution in pitch of the respiratory murmur, so that the actual sound is ultimately a low-pitched one.

MAXWELL⁹ suggests that "as the steady stream of air in the trachea and bronchi is broken up in the innumerable pulmonary alveoli, the pure sound is altered" ultimately.

The normal breath-sound is of a "whiffing" quality and resembles the "rustling of leaves in the wind." But, the assessment of sound by its quality depends on the more or less musical ability of the auscultator and as such, is subject to wide variations of expression. Evidently, it is not a reliable guide in diagnosing intra-pulmonary conditions; for, the personal factor which plays a great part in the estimation of quality, is an extremely variable entity.

Likewise, the intensity also is not a very dependable characteristic of the normal breath-sound. It is a changeable property and depends on the extent of the respiratory movements, the condition of the chest-wall, its thickness or otherwise, the depth of respiration etc., all factors having a profound influence even in individuals in perfect health.

For practical purposes, the pitch and, to some extent, the duration of the breath sound and the more so, of its inspiratory and expiratory phases, are the two stable characteristics. It is far easier to recognise differences in pitch or duration than differences in quality or intensity.

Physiologically, duration of expiration is longer than that of inspiration (1.2: 1), but heard through the stethoscope, it is shorter (1:2 or 3 or 4). Prolongation of the expiratory sound is the commonest abnormality. It is attributed to the loss of elasticity of lung tissue lying underneath. As a consequence, the alveoli become over-distended and remain so, even after an expiration, causing thereby an increase in the impure residual air. In the attempt to expel this excess of residual air, the expiratory effort tends to be prolonged. The auscultatory changes in the breath-sound in emphysema and asthma may be explained in this way.

It may be taken as an axiom that, wherever the pitch of the respiratory murmur is high, and that of expiration equal to or higher

than that of inspiration, there must always exist some pathological condition underneath. Judged by the pitch of expiration alone, the breath-sound is called broncho-vesicular (a term introduced into medicine by AUSTIN FLINT, 1812-'86), when it is equal to, and bronchial when higher than, the pitch of inspiration. Hence, the broncho-vesicular type of breathing is reckoned as the intermediate stage between true vesicular and true bronchial breathing. Normally, broncho-vesicular breathing is heard over the right apex, (due to the close proximity of the eparterial bronchus to the surface), and bronchial over the trachea and primary bronchi upto the level of the 4th thoracic vertebra behind, and the junction of the manubrium and body of the sternum in front.

Any abnormality in the pitch indicates interference with both the sound-transmitting and sound-producing properties of the lung; for, it has already been stated that the normal low pitch of the breath sound is the result of the combined influences of the selective transmitting property of the lung-parenchyma and the sounds produced in the alveoli.

This selective-transmitter property depends on the maintenance of the normal proportion of the solid to the gaseous elements in the lung. The more homogenous the medium, the greater will the interference with this property be, and higher will be the pitch of the ultimate sound. Evidently, broncho-vesicular breathing, which retains a part of the vesicular element as well, indicates a partial or deep-seated homogeneity with intervening normal lung tissue, a condition occurring in partial consolidation. In bronchial-breathing, on the other hand, the vesicular element is totally lost, and the lung becomes a homogeneous organ, as in complete consolidation. Though paradoxical, in large pleural effusions, too, or after thoracoplasty, when the lung is completely compressed, bronchial-breathing is often heard. This has been explained by assuming direct transmission of the sound from the bronchi to the fluid or to the chest wall, without the intervention of normal pulmonary substance and its selective-transmitter effects. But, in spite of the more or less homogeneity that is obtained in pneumothorax or small pleural effusions, the breath-sound in these cases is diminished or absent altogether. This has been ascribed to the imperfect production of sound, consequential to the relaxation or retraction of the underlying lung, and also to the "reflections of the sound at the different surfaces."⁷

Bronchial-breathing is also heard over superficial cavities in the lung, but there is an additional musical echoing quality associated with it. Such a sound is called amphoric and resembles the sound made by blowing across the mouth of a bottle. It is due to the production of high-pitched overtones with the fundamental note, and is the evidence of direct communication with a bronchus. The word "who" whispered, simulates the sound very closely.⁸

2. *The Voice-Sound or the Vocal Resonance* :—The next point to be considered is the condition of the voice-sound or vocal resonance,

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which has been defined as the sound that is heard over normal lungs when resonant words, like 99 or 1, 2, 3, are spoken or whispered, the latter, according to many authorities, being more important. It is due to the transmission of vibrations in the air-column produced by the voice, but as it is not as sharp and clear as the normal voice, it has been variously described as "muffled", "buzzing", and "indistinct" etc.

Observers explain it in different ways. MAXWELL⁹ attributes it to the loss of the "clear laryngeal tones, when the air-column is split up in the alveoli" (a change, which according to him, is also responsible for the conversion of the high-pitched bronchial component of the breath-sound to the ultimate low-pitch of the murmur). In addition, HARE¹⁰ takes into account the muffling influence of the chest-wall. ORNSTEIN and ULMAR,⁷ on the other hand, consider the selective-transmitter property of lung-tissue contributory. Normal voice, according to them, has a fundamental tone of frequency near 200 cycles per second with overtones upto 900-1000 cycles. It is the overtones, which give the sharp and clear quality of the voice, but as the selective-transmitter property of the lungs suppresses them and allows only the fundamental tone to pass, the result is a muffled and indistinct sound. Hence, the higher the pitch of the voice, the more indistinct will the vocal resonance be, as is evident from the fact that in women, it is normally more indistinct than in men.

The changes in the vocal resonance have been explained by the same underlying principles that govern the alterations in the breath-sound and bronchophony and pectoriloquy have been ascribed to an increased homogeneity of the lung-parenchyma, consolidation and cavitation respectively being responsible.

3. *Sounds in relation to the Breath-Sound* :—In addition to the changes in the breath and voice sounds, auscultation reveals the presence of some other sounds as well. These are called adventitious or added sounds, and are included in the term "rale", though, strictly speaking, "the rale" is a special sound produced in a particular part of the respiratory apparatus.

It may be stated as a general rule that the presence of adventitious sounds correlated to the respiratory murmur is pathognomonic, and as such, these have to be differentiated from the extra-pulmonary muscle, joint, or other sounds, which very closely simulate these and give rise to errors of diagnosis.

The sounds have been classified as dry and moist. The dry sounds, called rhonchi, have been further subdivided into low pitched sibilant ones, depending on the origin in the larger or smaller bronchi respectively. The moist variety, called rale or crepitation, has been similarly subdivided into fine, medium, and coarse, depending on the origin in the lung parenchyma, smaller and larger bronchioles respectively.

Such classification, into dry and moist varieties, has not been accepted by all observers, as it has been found that a certain amount

of secretion is always associated with the productions of sound. The following classification by MAXWELL,⁶ is simpler and more explicit, and is based on anatomical consideration. It has the additional advantage of being more practical, in as much as, it points directly to the part of the respiratory apparatus which is involved. He classifies added sounds as follows:—

(a) Produced within the larger bronchi:—

(i) Rhonchi———(Low-pitched).

(ii) Sibili———(High-pitched).

(b) Produced within the bronchioles—rales.

(c) Produced in the lung-parenchyma—crepitations.

The production of the rhonchus, which was at one time looked upon as a dry sound, has now been ascribed to the passage of air through inflamed or constricted "moist" bronchial tubes,⁷ the moisture sticking to the sides of the tubes, but not completely occluding the lumen. It is a continuous sound, and is heard both during inspiration and expiration, but most distinctly in the latter phase.

It has more or less a musical quality, and judging by the pitch of the sound, it is either sonorous (or low-pitched) or sibilant (or high-pitched).

The smaller tubes, the bronchioles and the alveoli, on the other hand, are completely blocked by the secretions. The column of air in passing through, produces bubbles, which burst suddenly as the intra-bronchial pressure increases. The clicking sharp sound produced by the bursting of the bubble is called a "rale",⁷ when produced in the bronchiole and crepitation, when in the alveolus.

The mechanism of production of the crepitation was at one time differently explained. It was supposed to be due to the sudden separation of the apposed alveolar walls during an inspiratory effort. But, later observers have opposed this view on the ground that normally the alveolar walls are never apposed, the secretion in the alveoli tending to keep them wide apart.⁷

The rale is heard during inspiration, mainly towards the end, and in the beginning of expiration also. It is a jerky sound and generally comes in crops, and may be mistaken as continuous. The crepitation, on the other hand, comes at the height of inspiration only, and resembles the sound made by "rubbing a lock hair between the fingers".⁴ (VON SWIETEN 1700-1772).

Emphasis has often been laid on the pitch of adventitious sounds as being of value in differentiating the intrinsic from the extrinsic forms of respiratory affections.⁷ It is stated that in inflammatory parenchymal disease like pneumonia, the secretion is thick, while in secondary non-inflammatory transudative involvement, e.g., following heart-failure, the secretion is thin. The resultant sound in the former

case is short, sharp and high-pitched, whereas in the latter, it is longer and of lower pitch.

Since differences in the intra-bronchial pressure is responsible for the production of the rale and the crepitation, it occasionally happens that normal breathing is not adequate to the purpose. In such cases, a cough or deep breath, by raising the pressure to the desired limit, often helps in eliciting the sounds. Hence, auscultation of the breath-sound following a cough is usually advocated.

Of the extra-pulmonary sounds correlated to the breath-sound, the most important is the friction-sound caused by the rubbing of the inflamed pleural surfaces against each other. It is a to and fro harsh sound heard during both inspiration and expiration, thus resembling a rale. It is an interrupted sound and is variously described as "grazing", irregular "jerky" etc. When very fine, and occurring at the apex, it resembles crepitations, and has to be carefully differentiated from them.

Sounds, like muscle or joint sounds, skin or hair sounds etc, which are not correlated to the breath-sound, but nevertheless heard during auscultation, often simulate the more important intra-pulmonary ones, and are potent sources of error. There is no distinctive characteristic, being heard independently of respiration as well. In a series of 250 cases of pulmonary tuberculosis, HAWES found muscle-sound in 57, joint-sounds in 126, tendon or bursal sounds in 10 and atelectatic crackles in 5.

The following table summarises the characters of the added sounds heard in auscultation:—

SOUND.	ORIGIN.	CHARACTER.	TIME.
Rhonchi	Larger Bronchi.	Continuous, musical, disappears with cough, low-pitched.	Inspiration and expiration but mainly the latter.
Sibili	Smaller Bronchi.	Do, but high-pitched.	Do.
Rales	Bronchioles.	Short, sharp, jerky, appears with cough, in crops.	End of inspiration and beginning of expiration.
Crepitations	Alveoli.	Fine, short, appears with cough.	End of inspiration only.
Frictions	Pleural surfaces.	To and fro, harsh, grazing etc, no change in cough. Pressure of stethoscope increases.	Inspiration and expiration.
Muscle, joint & other sounds	Muscle, joint and other extra-pulmonary structures.	Indistinct.	Independent of respiration and not correlated to the R. M.

Apology and Acknowledgment.—It is evident that nothing new or original has been mentioned in the above few pages, rather much good material has been omitted. This is deliberate. No attempt to be exhaustive has been made. I have only touched upon the subject, endeavouring to stimulate the students' interest in the fascinating art of auscultation, and to present the basic principles underlying the various signs in one place. These are generally found scattered over different text-books and the student is often in difficulties in searching them out. Whether I have succeeded, I leave my student-friends to judge.

In conclusion, I thank the authors from whom I have quoted and drawn freely. I thank the colleagues whose sound advice from time to time has been of great help. Finally, I convey my thanks to the Editors of *The Antiseptic*, for asking me to write a paper for their "Respiratory Disease" Number—an honour to which I certainly have no claim.

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The Common Respiratory Ailments in Obstetrics

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PREGNANCY, when complicated by a respiratory disease, necessitates a close observation of the case by an obstetric physician for the efficient and thorough treatment of the disease present so as to make the pregnant woman free from it before the actual onset of labour, or, if that is not possible as in the case of chronic diseases, to determine and outline the mode of treatment to be adopted during pregnancy, labour and puerperium. The respiratory diseases, as they invariably affect the oxygenation of the mother's blood in varying degree, may indirectly produce harmful effects on the foetus, which has to depend for its oxygen supply on the placental blood. If there be an additional factor of infection associated with it, its toxic effects become further augmented and in severe cases often lead to premature labour and death of the new-born. The pregnant mother too has a different prognosis from that in the non-pregnant state and certain diseases like influenzal pneumonia and active pulmonary tuberculosis may hasten her end, owing to the pulmonary lesion or to the possibility of uterine sepsis following labour. In the consideration of these lesions only those, which are usually met with, will be considered.

Non-infective Lesions.—*Epistaxis during Pregnancy and Labour:*—

This is often a very troublesome complaint especially if of the primary variety. The secondary or the symptomatic one is less severe and often yielding to treatment and is due to hypertension, nephropathy and blood diseases with deficiency of blood platelets and R. B. C. The primary or the hormonal one is the result of functional anatomical changes in the structure of the pituitary gland during pregnancy causing congestion of the nasal mucosa. Primary epistaxis, if it occurs, results in an intractable hæmorrhage and may lead to death from acute anæmia.¹ Such patients sometimes give the history of nasal bleeding even during normal menstruation. Treatment consists in blood-letting in high blood pressure cases, blood-transfusion in blood diseases and nasal plugging and hormone, especially progesterone, in primary variety.

Emphysema:—This is usually aggravated in pregnancy and if the symptoms become so distressing as to endanger the life of the mother by severe dyspnoea, the termination of pregnancy may have to be resorted to.²

Acute Dyspnoea:—This is the result of the sudden enlargement of the gravid uterus, interfering with the descent on the diaphragm. This is often due to acute hydramnios and the easiest way to relieve dyspnoea is by drainage of the amniotic fluid. It should be carried

out very gradually so as to avoid sudden shrinkage of the uterus which may result in rapid separation of the placenta and internal hæmorrhage. After the rupture of the membranes, labour sets in naturally in due course. Paracentesis, through the abdominal wall, is also advocated, but there are possible risks of injury to the bladder, the blood vessels in the uterine wall and the placenta.

Acute Pulmonary Edema:—This lesion, during pregnancy and labour, manifests itself by sudden and increasing cyanosis and collapse with expectoration of copious quantity of pink frothy fluid. It is really the result of associated disease such as hypertensive arterial disease or acute or chronic renal disease and the attack is precipitated by its effect produced on the function of the heart. There may result a dissociation in the action of the two ventricles or enfeebled action of the left ventricle. The condition may last from a few minutes to some hours. Injection of $\frac{1}{2}$ gr. Morphia with Atropine $\frac{1}{75}$ gr. should at once be given and about 12 to 15 oz. of blood should be removed by venesection in order to relieve the congestion of the lungs. During labour, if the cervix is found to be fully dilated, the delivery should be rapidly effected by forceps application.

Pulmonary Embolism:—This lesion is usually found during the puerperium. There is first thrombosis of the pelvic veins and of those of the thighs following labour. The lodgement of the thrombus in the lungs from this primary lesion gives rise to sudden pain in the chest with irregular gasping respiratory movements. The patient very often becomes unconscious and may either recover or die³. If surviving, the nature of embolus decides the prognosis. If it is septic, it may lead to localised lung abscess, but if otherwise, no serious complication will follow, except a constant pain in that area for days together till resolution takes place. The treatment of the embolus proper by embolectomy can hardly ever be carried out.

Bronchial Asthma:—This disease, when found in a pregnant woman, often leaves the obstetrician in great dread of a mishap during delivery, when the patient has to strain at each uterine contraction during the second stage of labour—thus producing considerable embarrassment of the heart and the lungs. There is usually associated chronic bronchitis and emphysema of the lungs and varying degree of degeneration of the heart muscle, which may be unable to stand the added strain of even a normal labour. Pregnancy itself is very rarely affected by the presence of the disease, as there is no special tendency for abortion or premature labour. The disease may, on the other hand, show a slight improvement in the later months of pregnancy owing to tendency to acidosis during that period⁴, since alkalosis is supposed to precipitate an attack and is very often the reason for increased incidence of asthma during winter.

There are two types of this disease: one is the usual anaphylactoid type and the other, related to sexual function. The former is present before the onset of pregnancy and persists throughout the rest of life. The presence of pregnancy aggravates the disease by increasing

the severity and frequency of asthmatic attacks⁵. Nearly half the children born to such asthmatic parents show allergic reaction within the first ten years of their life.

The other type of asthma related to sexual mechanism presents two varieties, the one, often called *asthmopathia gravidarum*, occurs during pregnancy only and the patient remaining free from the disease during the non-pregnant state. Sometimes, it is seen to be present in the patient when she is carrying the foetus of a particular sex. Various factors have been attributed to its causation and some of them are—the vagotonic effects produced by oestrogenic hormone, deficiency of calcium and parathyroid or the absorption of foreign proteins from the placenta and the foetus.

The second variety of sexual asthma is peculiar in the sense that its attacks occur at each menstrual period, is absent during pregnancy and lactation and then recurs with the reappearance of the menses. It is supposed to be due to sensitisation by the products of endometrial disintegration. As this variety does not manifest itself during pregnancy, it is not important from obstetric point of view.

Management of the Patient:—In the treatment of the asthmatic pregnant patient, asthma should be attended to first, even disregarding the presence of pregnancy. The change of climate is often beneficial. Whenever possible, allergic test should be carried out to find out and eliminate the offending proteosis from the food, especially when the attacks are of anaphylactoid type. Injections of Arsenic along with the dissolved vaccine are sometimes found curative. Full course of injections, such as *Arseno-Asthmaticus*, are often found beneficial without any ill-effects on pregnancy. Asthma related to sexual function may be reduced in severity by intravenous Calcium injections and Corpus Luteal preparation intra-muscularly to reduce the action of oestrogenic hormone. If the disease increases in severity, in spite of treatment and if the chronic bronchitis is severe and progressive, interruption of pregnancy or induction of premature labour should be seriously thought of. If the case is of *asthmopathia gravidarum*, it is all the more reason for therapeutic abortion or termination of pregnancy, as the existence of the disease is merely due to the presence of the gravid condition.

During labour, the use of forceps should always be made as soon as the cervix is fully dilated and the head well descended into the pelvis. The energy of the heart should be maintained by cardiac tonics and the repeated use of concentrated glucose solution intravenously. The use of Adrenalin during labour for the asthmatic condition should be made with caution.

CASE: Asthma with hydramnios. Patient, Mrs. N. R. D., a subject of asthma for many years, Para X, aged 37, was admitted to the hospital with severe hydramnios and dyspnoea in the seventh month. She had treatment for asthma by injections of dissolved vaccine before the onset of pregnancy, but with very little improvement.

Rupture of membranes was carried out on 26-1-40 with much relief in her dyspnoic condition. Patient delivered on the 29th January '40, premature child of only 3½ lbs. During the puerperium, the patient used to get attacks of asthma at nights and had to be injected with Adrenalin. Ultimately, treatment with injections of Arseno-Asthmaticus was started and the patient was advised to go out for a change. The case was not of pure dyspnoea owing to hydramnios, but was complicated by asthma, which continued even after the evacuation of the uterus. The termination of pregnancy had to be undertaken for the benefit of the mother.

Infectious Lesions.—These prove to be rather serious ones from the view-point of prognosis of the pregnant mother and the child and also on account of the series of varied complications that may crop up from their presence. The strain of labour is usually associated with the lowering of vitality of the healthy mother and it may be still further reduced by the presence of toxic condition or by post-partum hæmorrhage so severe as to render the mother markedly anæmic. In circumstances like these, even the minor infections, such as acute coryza or acute bronchitis, just before or at the time of labour, should not be treated too lightly as they may become the causative factors in the production of child birth fever.

Common Cold or Acute Coryza:—DOCHEZ, in 1931, definitely proved by means of experiments that it is a highly contagious virus disease and its attack produces a marked increased activity on the part of the potential pathogens normally present in the throat e.g. *Pneumococcus*, *Streptococcus hæmolyticus*, *Bacillus influenzae* and *Micrococcus catarrhalis*. Now it is well known that these organisms play a prominent role in the causation of puerperal sepsis of exogenous variety so that a patient or nurse, affected with this lesion, is likely to infect other maternity cases in the hospital. The same applies to acute tracheitis and bronchitis in which also the similar series of organisms play a very prominent role. The pregnant patient should be treated thoroughly for these complaints, though they may be considered as minor in our daily life. The delivery of such an infected patient should always be conducted in a separate room in maternity hospitals and the child should be well protected from catching the infection from the mother by making the mother wear a mask during labour as well as at each feeding time compulsorily.

Influenza:—This is a very serious complication of pregnancy, especially when of pneumonic type. The susceptibility to this disease increases as the pregnancy advances more and more. The mild or the epidemic type occurs during the cold seasons. The attack is sufficiently prostrating and the pregnant mother must take every precaution against catching that infection. Although in very mild form of disease, there is hardly any effect produced on the course of pregnancy, yet during the severe epidemic, the general mortality rate is very high among pregnant women. The pneumonic type, on the other hand,

is a matter of utmost gravity as the mortality among such patients is well above 50%, and abortion and premature labour are far too common—the spontaneous termination of pregnancy occurring in nearly 60% before the death of the mother. This may be brought about by the direct result of infection, which produces sufficient toxæmia to cause intra-uterine death of the foetus. Deficient oxygenation of the mother's blood is also a contributory factor in the foetal deaths and premature labours.² The artificial termination of pregnancy during the attack of fever has no favourable effect on the course of the disease; the maternal mortality, on the other hand, is still further increased.

TREATMENT.—The patient should avoid possible exposure to cold, influenza or pneumonia. During the attack, early use of oxygen should be made and opiates should be used freely. Dehydration and starvation should be treated with intravenous glucose saline. Quinine and purge should be avoided in the treatment and on no account should the obstetrician think of interference to terminate the pregnancy. He can, however, make use of forceps to assist the mother in the second stage of labour in order to save her from exhaustion. Post-partum hæmorrhage is much more frequent and resort may ultimately be taken to pack the uterus, which often fails to retract and remains lax in spite of Oxytocic injections and the usual treatment of post partum hæmorrhage.

Prognosis is much worse if the disease is contracted just before or during labour than if it begins after a few days in the puerperium.

Pneumonia:—This is an infrequent yet a very serious complication of pregnancy, the pregnant woman being susceptible to it owing to low general condition. The common cold precedes the development of pneumonia during pregnancy and it is likely to develop in the puerperium in the patient who gets an attack of common cold at the time of labour.

The course of the disease is just the same as in non-pregnant condition. In early pregnancy, there is no materially increased danger to the mother, though it often leads to abortion in one third of the cases. In the second half of pregnancy, the disease produces serious effects on the mother, the maternal mortality being in the region of 50%. It is further increased among those, whose pregnancy is terminated during the illness, either artificially or owing to onset of natural premature labour. Spontaneous premature labour is brought about by the causes as stated in influenzal pneumonia. In addition to those, pneumococci can be demonstrated in the organs of the still-born foetuses—thus indicating the direct action of the organisms on the foetus. In the mother, pneumonia at term or in the puerperium may favour hæmatogenous puerperal infection and make the case more complicated. The cross infection from the other patient in the hospital is likely to occur in the puerperium and hence the patient with pneumonia must at once be isolated.

MANAGEMENT OF THE CASE.—Adequate treatment of common cold, during the antenatal visits, is an important means of preventing pneumonia during pregnancy and the puerperium. During an attack, prolonged rest in bed, plenty of fluids by mouth and light diet should be insisted upon. Early use of oxygen, in order to avoid severe dyspnoea and cyanosis in the mother, must necessarily be made, both out of interest to the patient and the foetus. Mild opiates like Codein should be used in the early days of the disease but later on the heart should be supported by Coramine, Digitalis and Alcohol. The Anti-pneumococcic serum, especially of the types one and two, is very beneficial. The diagnosis about the type of the pneumococci can now be made easily in a few minutes by using NEUFELD'S technique. The sputum containing the organisms is directly tested against specific immune sera. The positive reaction is obtained by the visible swelling of the capsule of the organisms under the microscope. In this way, all the 32 types can be readily tested and the nature of the type of the infecting organisms detected. The serum seems to work best in pure type one and two infections.

Since the introduction of Sulfapyridine, the prognosis of all types of pneumococcal infection is marvellously improved and a free use of the drug should be made even in pregnant cases, without any additional risk other than those usually associated with this type of drug. But on no account should the obstetrician undertake to induce premature labour during the course of the disease. Natural labour, however, must be assisted by forceps application, after the full dilation of the cervix. The general anaesthesia must be avoided as far as possible.

Laryngeal Tuberculosis:—Laryngeal involvement, in pregnant tuberculous women, is but occasionally seen. During pregnancy, there is congestion of the larynx, especially the false vocal cords, so that the lesions easily develop in that area, and are associated with breathlessness and dysphagia. The patient may pass through the pregnancy uneventfully; but if the lesion advances during that time the prognosis becomes unfavourable. The usual treatment for irritant throat cough is sufficient, and Linctus Codein is often soothing. Anti-tuberculosis treatment should be started at once. If the disease is found rapidly progressive, induction of labour may be tried.

Pulmonary Tuberculosis:—Extragenital tuberculosis is by no means a bar to conception, and in spite of the fact that presence of pulmonary tuberculosis may be in some cases, associated with secondary amenorrhoea, the tuberculous patients as a group are often very fertile. It is now definitely established that it is harmful for a woman with tuberculosis to become pregnant, because the pregnancy has a deleterious effect on the tuberculous process, a latent focus being stimulated to activity,² and because after each pregnancy the patient is left with more and more advanced nature of the tuberculous lesion. Patients may, however, manifest an apparent and occasionally a real improvement during pregnancy, but this is rarely if ever

maintained soon after delivery. The temporary improvement in the mother's condition is due to a number of factors. First of all, the suppression of menstruation leads to the stoppage of blood loss every month and the storage in the body of blood calcium which is so useful in the improvement of a tuberculous focus. During pregnancy, anabolic processes are predominant and they stimulate growth and recovery in the body. Some amount of bodily rest is also obtained by the mother owing to the presence of pregnancy thus conserving muscular energy and vitality. As the pregnancy advances, the growing uterus, by exerting pressure upwards, limits the movements of the diaphragm with each respiratory movement, thus giving rest to the tuberculous lesion in the lungs. The pressure on the right ventricle and the pulmonary bases, impedes the venous return from the lungs, thus producing pulmonary congestion which is so useful for healing. In short, the growth of the uterus and the general changes produced in the body owing to pregnancy are such that it is but natural that some improvement in the general condition of the patient must necessarily be expected.

If at all any injurious effects begin to appear, they do so commonly at term. They increase during puerperium and reach their maximum when lactation is fully established. No type of tuberculosis is immune to this influence so that a latent infection may become activated, quiescent lesion is reactivated and active disease is made more active⁶. According to ADIAR, three periods are most hazardous to the pregnant mother, namely first trimester, during labour and early puerperium. At the time of labour, the muscular actions produce marked exhaustion in the mother. The deep respiratory efforts required during this time help to spread the infection from the active foci to the healthy area of the lung, thus favouring the development of diffuse tuberculous broncho-pneumonia. Moreover, after the evacuation of the uterus, its reduced size allows the free movements of the diaphragm so that the lungs are robbed of their partial rest, which they have been enjoying during pregnancy. In the puerperium, the katabolic processes bring about the involution of the uterus with autolysis and absorption of enlarged muscle fibres and atrophy. The same applies to recently healed tuberculous lesion with young delicate fibrous tissue, which may be easily destroyed. The process of lactation is also a burden on the mother and puts a sufficient drain on her calcium storage. With all these factors operating adversely, the mother's health is naturally affected and exacerbation of the disease invariably occurs during the early puerperium.

The Effects of Tuberculosis on Pregnancy:—Tuberculosis has very little direct effect on the course of pregnancy. In quiet non-febrile type of lesion, there appears to be no tendency to premature labour. The advanced or active severe tuberculosis is sometimes associated with toxæmia and then premature labours and macerated still-births are quite frequent. The offspring, even if born healthy, has lowered resistance to tuberculosis, so that it is likely to develop this disease if

it happens to be in contact with the infected mother or some other infected person.

The Effects on the Child:—As stated above, in active cases, premature labours and still-births are quite frequent, yet, in milder forms the children, when born alive, are without any sign of that disease. The death rate among them during the first month is up to 7% and is mainly due to progressive wasting without an anatomical lesion. According to FORSSNER, the children taken away from their mothers seem to run no undue risk, hardly 5% being affected, while among those remaining with their mothers, 50% succumb to tuberculosis⁷. WARD, after an extensive statistical study, came to the conclusion that a child of tuberculous mother, living with its parents, is seven times as likely to develop tuberculosis as the child of a healthy mother; but if the infants are entirely separated from their parents from birth, they are just as likely to grow into healthy adults as the children of normal parents. CALMET found that 25% of the children die within one year if brought up in the tuberculous environment and the mortality of infants in the first month fell, according to CONVELAIR, from 33% to 7.3%. In short, the child of a tuberculous parent should be removed from its mother soon after birth and every precaution should be taken that it does not go into progressive wasting by regulating suitable and adequate feeding and giving plenty of vitamins and fresh air. The intra-uterine infection of the foetus is not now accepted by all. The possible ways of infection as thought of were as follows:—

The germinal infection in which tubercle bacilli may be carried by spermatozoa or ova either in the interior or on the surface, the transplacental infection by the filtrable form of the tubercle bacillus or the infection of the foetus during birth by the forcible contractions of the uterus, transmitting the organisms into the vessels of the umbilical cord. In no case, however, can the tubercle formation be demonstrated in the structure of the villi or the intervillous spaces, though occasional tubercle bacilli can be traced through the epithelial lining of the villi into the inside of the capillaries of intact free villi. Thus, when placenta acts as an efficient barrier against the infection by tubercle bacilli, it is but evident that ante-natal infection of the foetus must be a rarity.

The Course of Illness:—The patient, who had been showing signs of improvement during pregnancy, soon after labour, begins to get daily rise of temperature in the puerperium, thus indicating the activation of the disease. Sometimes, the pulmonary lesion may become so active that tuberculous broncho-pneumonia may set in. This condition will have to be differentiated from pure puerperal infection and ordinary pneumococcal pneumonia following labour. The examination of the sputum will often clinch the diagnosis.

TREATMENT.—Thorough sanatorium regime and discipline during pregnancy and postnatal period are the essentials in the management of tuberculous pregnant patients, who should be hospitalised in such

institution and be constantly under the observation and care of tuberculosis specialist. The fact that the patient is pregnant or is to have her delivery in a short time, need not be an excuse for discharging the patient from the sanatorium and admitting her in general maternity hospital⁸. On the other hand the delivery of such a patient should be carried out in the sanatorium without an interruption to her usual anti-tubercular treatment. The new born baby must be kept separate from the mother and should never be allowed mother's breast. But, if the mother is having a healed lesion, it may be nursed for 6-8 weeks⁹. Prolonged post-natal care of the mother in the institution is essential and she should not be put to the strain of upbringing the child.

The general treatment consists in the one, usually given in the sanatorium—namely fresh air, liberal diet, rest to mind and body, freedom from worry, careful supervision of nursing and calcium and cod-liver oil by mouth. Therapeutic abortion should never be employed as a routine as was the custom even upto a few years ago. There is nothing gained by terminating the pregnancy, as the patient is thereby only robbed of the beneficial effects that are seen during the course of pregnancy. If interruption of pregnancy is to be done, as is only required in early active lesion, an early diagnosis of pregnancy by means of biological test should be made so that abortion can be carried out with least possible trauma and risk to the mother¹⁰. Latent and quiescent lesions never call for the termination of pregnancy, but a careful watch must necessarily be maintained for signs of activity. In the case of early active diseases, if detected during early pregnancy, short trial to sanatorium treatment must at once be instituted. Pneumothorax, if found suitable, must also be carried out. But, in spite of all these measures, the disease is still found progressing, induction of therapeutic abortion must be carried out without much delay. Early active lesions, found out late in pregnancy or advanced active disease, detected any time during pregnancy are, however, no indications for its termination, as no good will issue from operative interference; "on the other hand, it will only help to hasten the death of the mother. Thus, if a gestation in a tuberculous woman is to be interrupted, the uterus should be emptied not later than the 12th week and if the pregnancy is allowed to continue, strict tuberculous regime should be instituted from the very beginning of pregnancy.

Now, as regards the question of the method to be used in emptying the uterus, if the pregnancy is advanced upto the 8th week, removal of the ovum per vaginum is easy. But, as there is possibility of pregnancy following soon after, the use of contraceptive¹⁰ must be insisted upon, until 3 years after the disease has abated as indicated by 'no tubercle bacilli' in the sputum or absence of daily rise of temperature at least for a month continuously. Abdominal Hysterotomy under local or spinal has the advantage that sterilisation of the patient can be carried out at the same time, while the evacuation of the uterus can be effected with bloodless and aseptic method. Some authorities advocate hysterectomy, so that subsequent amenorrhoea

and calcium retention may favour the healing of the tuberculous process.

When a tuberculous patient is allowed to go to full term, her labour ought to be managed efficiently. The loss of blood during labour should be prevented and in order to reduce the exhaustion of the mother and also the wide excursions of the diaphragm during the second stage, forceps should be used as soon as the cervix is fully dilated and head descended in the pelvic cavity. In the puerperium, lactation should be forbidden and the mother should take complete rest in bed for at least a month after the temperature remains normal and sputum becomes free from tubercle bacilli. Prognosis and treatment of tuberculous pregnant mothers have been very much altered since the more popularization of collapse therapy, which can be carried out by phrenic avulsion, thoracoplasty, oleothorax and pneumothorax. Of these, the last is more simple and so often utilized that it may even prove to be a welcome substitute for therapeutic abortion, and a better prognosis may be expected from it. The factors affecting the prognosis depend upon the duration of pregnancy, parity and the type of lesion. The prognosis for patients in whom tuberculosis had been discovered and treated with collapse therapy before the occurrence of pregnancy is better than in those who first become aware of their tuberculosis and begin treatment sometime during pregnancy. Primiparas are seen to fare better and the collapse therapy can be started any time during the course of pregnancy and bilateral lesion is no contraindication for its use. But collapse therapy is by no means without any untoward complication. The artificial pneumothorax may, on rare occasions, be associated with pleural shock, extensive collapse with severe dyspnoea, deficient oxygenation of blood and even premature labour, adhesive pleurisy and digestive disturbances. But on the whole, the results of collapse therapy are favourable and represent great advance so that the problem of tuberculosis and pregnancy may be solved by provision of modern treatment for tuberculosis which should also include strict sanatorium life and collapse therapy.

(CASE No. 1. Bilateral Pulmonary Tuberculosis. Patient, Mrs. S.V.J., second para, aged 26, (weighing only 86 lbs.), pale and much emaciated, with signs of bilateral T.B. lesion at the apices of both lungs, had her normal confinement on 10-3-40, a week before the expected date of delivery. Her first confinement was also normal full term labour. After that, she was suspected to be suffering from T.B. of lungs but no thorough treatment was given as was noted from the history that she gave. From the second day of the present confinement, the patient started with daily rise of temperature up to 100°-101°, which used to come down to normal in the evenings. Marked cough with expectoration appeared, and the tuberculous lesion at the apices became quite distinct. Patient was transferred to a sanatorium at Miraj, where she was given anti-tuberculosis treatment, with repeated pneumothorax. Patient was in the sanatorium for three months during which time

the condition grew from bad to worse, and ultimately developed complications—T.B., peritonitis and diarrhoeas and expired by the end of May'40. The male child which was 5½ lbs. at birth, was separated from the mother as soon as the T.B. lesion was detected and was brought up in a different family. In spite of it, it died of wasting disease within three months. In this case the affection was detected soon after labour. It became active and rapidly progressive. The patient did not get the benefit of prolonged ante-natal supervision; and with the activation of the lesion, she became worse in spite of pneumothorax and sanatorium treatment.

CASE No. 2. Acute Pulmonary Tuberculosis: Patient—Mrs. L. M.P. para II, aged 23, weighing 101 lbs. with the history of first still-birth, was admitted three weeks before the expected date, with labour pains, and delivered normally. Patient was getting daily rise of temperature upto 99-100°F. During the first few days of the puerperium, she was having severe, cough with typical expectorations and crepitations at the right apex. She was kept isolated in the hospital and the baby which was weighing 5½ lbs. at birth was fed on outside milk. The lesion in the mother did not show any further aggravation. Patient was advised to go straight to her native place which was quite suitable for T.B. patients. In this case, though the delivery had taken place prematurely, there was not much activation of the disease.

CASE No. 3. Patient—Mrs. S.D.V. para III, aged 30, weight only 65 lbs. with bilateral ankylosis of the knee joint with typical tuberculous deformity and having daily rise of temperature, was much emaciated and was having tuberculous diarrhoea. She consulted in the 5th month for the termination of pregnancy but was advised otherwise and was given anti-tuberculous treatment with cod liver oil and Calcium and an advantage of open air life. During the antenatal treatment, she gained in weight by about 10 lbs. The confinement took place three weeks before the expected date without any difficulty. A female child, weighing 5 lbs. was born. Patient did not develop any rise of temperature in the puerperium though diarrhoea once again appeared. She was advised change of climate to some dry place. This patient had received the benefit of the ante-natal treatment. The T.B. lesion was detected and treated from the 5th month. No material advantage would have been obtained, had the pregnancy been terminated when the patient first consulted in the 5th month in a very run down condition. She, however, could stand the strain of natural labour at term without much risk.

On going through the records of 750 consecutive deliveries during the last year and a half, there were 7 cases of asthma, one of which needed termination of pregnancy. That case was further complicated by hydramnios and the patient was severely dyspnoeic. There were two cases of epistaxis, both of secondary variety, with high blood pressure from pregnancy toxæmia. One of them continued to bleed

even during the puerperium. There were 7 cases of influenza, five post-natal and two admitted to the hospital for delivery with fever on. Both these cases delivered prematurely. There was no mortality among the mothers and the babies. There was only one case of pneumonia, the delivery taking place during the fever and the patient ultimately expired on the thirty-first day of the illness, the patient not being able to stand the strain of even normal labour. There were three cases of active tuberculosis, the detailed histories of which are mentioned above.

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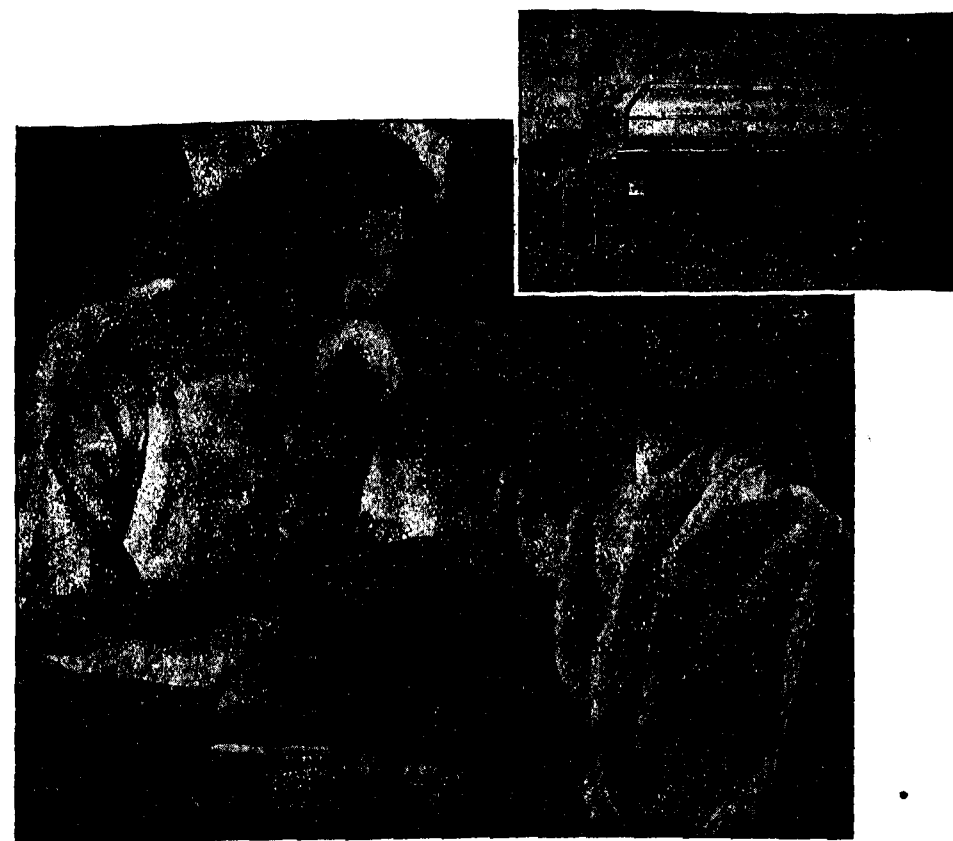
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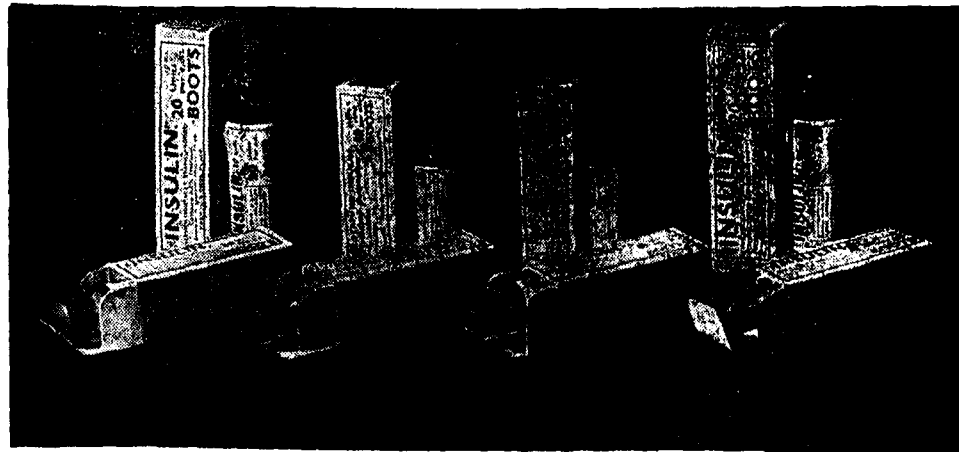
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The Respiratory System in Malaria

BY

Dr. Alice B. S. Smith, M.D., D.P.H. D.T.M., L.M.,
Pulicat, Ponneri Taluq.

SIGNS and symptoms clinically referable to the respiratory system, are quite common in all types of malarial infections. Most text-books, however, fail to bring out the important implications of this fact and tend to pass the matter over with a brief reference to the association of bronchitis with malaria. Consequently, patients are labelled "bronchitis", "pneumonia", "tuberculosis", etc., and treated as such, while the responsible factor is ignored to the detriment of the patient.

The object of this paper, therefore, is to emphasise the point that it is comparatively rare to encounter a case of malaria in which there is not some clinical sign or symptom referable to the respiratory tract.

Rapid Breathing.—When a patient is first seen during a malarial paroxysm, the rapidity of the breathing may attract the attention and arouse the suspicion of pneumonia, but examination of the lungs produces no confirmatory evidence.

While in pneumonia, the breathing is nasal in type, rapid and distressed and accompanied by dilatation of the alae nasi, in malaria, the breathing, though rapid, is not distressed; a hissing sound is heard during inspiration and expiration as the air is forced through partially clenched teeth, but the characteristic expiratory grunt of pneumonia is not heard.

Herpes.—Labial herpes is another sign which the medical mind usually associates with lobar pneumonia, but it is so commonly seen in cases of benign tertian malaria that, in the absence of pneumonia, it may be considered diagnostic of that type of infection.

For some abstruse reason, the preponderance of herpetic eruptions occur on the left side of the lip, and the upper lip is preferred to the lower.

Epistaxis.—Amongst the hæmorrhages, which may complicate chronic or relapsing malaria, recurrent attacks of epistaxis sometimes occur. Local examination usually reveals little, except slight congestion of the nasal mucous membrane.

Cough.—Most patients suffering from malaria, complain of cough. Auscultation of the lungs may reveal generalised rhonchi or scattered areas of moist rales. On the other hand, nothing abnormal may be found, in which case the naso-pharynx will almost certainly be found to be red and congested.

Sometimes, cough manifests periodicity in an interesting manner. Shortly after midday, on days synchronising with the periodicity of the fever, the cough becomes irritating and almost incessant and the

patient is conscious of a constant desire to clear the throat. In the cases, where physical signs have been found in the chest, the patient may expectorate thick tenacious sputum after much effort. More often, it is an ineffective cough, and nothing but a little frothy mucus is expelled. Then towards 4 p.m., the irritation begins to subside and the cough becomes less constant.

Pleuritic Pain.—In the early stages of an attack of acute malaria, complaint is commonly made of “பக்க சோவு”. The pain, which resembles the pain of pleurisy, is complained of most often in the region below the left nipple in the axillary line. Friction is not detected on auscultation. The pain probably comes via the diaphragm from a perisplenitis and is usually one of the first of the symptoms of malaria to disappear under treatment.

Laryngitis and Tracheitis.—In an endemic area these conditions often complicate malaria. They are associated with a degree of fever quite out of keeping with their usual simple forms and respond to Quinine therapy.

Bronchitis.—Bronchitis, either acute or chronic, is an exceedingly common symptom of malaria, in benign tertian infections, may be practically, the only symptom.

As it is met with in a variety of pathological conditions, mistakes in diagnosis may easily arise. In a district where malaria is prevalent, it is wise to treat every case of bronchitis as a case of malaria till proved otherwise. Treatment with Quinine, generally, soon brings out some sign of periodicity to prove its malarial origin, for it is an interesting fact, that many cases of malaria show no signs of periodicity at all, till Quinine therapy has been started. The return of periodicity is often the first sign that the diagnosis was correct.

Broncho-pneumonia.—Untreated cases with bronchitis sometimes go on to broncho-pneumonia. This is especially so in young children. In treating such cases, it is well to remember that children and even infants tolerate relatively large doses of Quinine very well.

Asthma.—There is a fair amount of evidence to show that the malarial protozoon may be the exciting cause of asthmatic attacks. The matter, however, must be treated with reserve, for there is not enough clinical evidence to support the theory. Asthma is notoriously of seasonal prevalence which may account for its being so frequently met with during the malarial seasons. Further, asthma is a symptom of so many varying conditions and infections that the presence of some other exciting factor is quite possible. A therapeutic test is not altogether of value, for most cases of asthma, whatever their basis, respond readily to the Adrenalin type of drug.

It has been noticed, however, that the sufferers from asthma are found rather amongst those showing indications of latent malaria than amongst those having acute paroxysms; and moreover, that patients thought to be sensitive to the malarial toxin, cease to have recurrent attacks of asthma after adequate Quinine therapy has been instituted.

Tuberculosis.—Subjects of chronic malaria, who have reached the cachectic stage, often present a clinical picture which simulates that of phthisis. The wasted appearance, combined with irregular attacks of low fever and persistent cough, are suspicious enough and physical examination of the chest is not always reassuring. Unless the assistance of the laboratory is available, it may be very difficult to eliminate phthisis. Tuberculosis is common amongst ill-nourished villagers who when further debilitated by long-standing malaria, are rendered even more susceptible to tuberculous infection.

Pneumonia.—The association of lobar pneumonia with malaria is perhaps, the most interesting of all the respiratory complications of malaria.

True pneumococcal pneumonia can and does occur in endemic areas and at the same time malarial parasites are sometimes found in the blood.

It may be that the pneumococcal infection acts as the exciting factor in stirring up a latent malaria; it may be that the lowered resistance caused by an attack of malaria predisposes to pneumococcal infection; or it may be that both infections occur simultaneously, their association being purely coincidental.

Many cases, however, present features which indicate the probability that the malarial parasite is the actual cause of the pneumonia.

In making this suggestion, due regard is given to the opinion of those who maintain that lobar pneumonia can be caused by the *Pneumococcus* only, and that the so-called influenzal, streptococcal, malarial and other pneumonias are cases where the infecting organism has so lowered the resistance of the patient that the *Pneumococcus* (said to be present in the respiratory tract of about 60% of the population) is able to attack the devitalised tissues of the lungs.

Locally, the physical signs and symptoms do not seem to differ from these found in a typical pneumococcal lobar pneumonia, as it passes through its various stages.

Were full facilities for sputum culture and blood examinations available in country districts, the question of the original cause could be more easily solved.

In the absence of such conclusive evidence, one or two points will be mentioned here which seem to favour the idea that the malarial parasite is the causal factor.

1. *Distribution*.—In country districts, where malaria is prevalent, lobar pneumonia also is prevalent. This is not in accordance with the customary teaching that pneumonia is a disease of cities. There are also country areas where causes, other than malaria, of lowered resistance are common, but in which a high incidence of lobar pneumonia is not reported.

2. *Predisposing Factor*.—If symptoms of lobar pneumonia and of malaria appear about the same time, it is difficult to believe the

theory that the one disease is the result of lowered resistance caused by the other.

3. *Signs and Symptoms*:—In cases of malarial pneumonia, other symptoms of malaria are usually present such as, burning sensation in the eyes, headache, nausea, etc., and the pulse in rate and quality favours the malarial type rather than the pneumococcal type. The spleen is generally enlarged and firm, and parasites (usually benign tertian) are found in the blood or, in chronic and relapsing cases, a relative increase in monocytes (pigmented) may be found.

4. *Periodicity and Temperature*:—Some sign of periodicity is generally noticed and can be detected most readily in the temperature chart. Pneumococcal pneumonias tend to maintain a fairly constant level until the time of the crisis approaches; in malarial pneumonias, a greater range of temperature is noticed between night and morning and from day to day.

5. *Site*:—The majority of pneumococcal pneumonias attack the right base of the lung; the malarial pneumonia is found almost exclusively at the left base or one or the other apex.

6. *Sputum*:—The sputum is comparatively rarely blood-stained.

7. *After-Effects*:—Pneumococcal pneumonia is notoriously liable to recur and empyæma is a common after-effect. Empyæma has not been found amongst the malarial cases seen personally, nor is a history of recurrence common amongst them.

8. *Quinine Therapy*:—The exhibition of Quinine soon brings about improvement in the patient's general condition though, once the lung is definitely consolidated, little effect on the local condition can be determined. Cases occur, however, which the medical practitioner would confidently consider to be cases of incipient lobar pneumonia. These are aborted completely by prompt Quinine therapy. They are such cases as have reached the stage of pleuritic pain, impaired percussion note over one lobe, indurated crepitations and even early tubular breath sounds.

It is doubtful whether pneumococcal cases of pneumonia could be thus aborted by Quinine alone.

As regards the treatment of pneumonia in malarious districts, if a blood examination shows a dearth of leucocytes instead of the characteristic leucocytosis of pneumococcal pneumonia, or if any other evidence suggestive of a malarial basis is noticed, Quinine therapy alone should suffice to bring about a cure.

In cases where the cause is doubtful, treatment with Quinine and with M. and B. 693, can safely be combined, by giving the latter by mouth, and the Hydrochloride of the former by intramuscular injection.

The immediate concern of the rural practitioner is the successful treatment of his patients, hence the importance of being alive to the association of respiratory with malarial conditions.

Chronic Non-Tuberculous Pulmonary Affections

BY

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WHENEVER a patient presents himself for examination with a complaint of cough for some months and fever off and on, the physician has to think of all the probable diseases affecting the respiratory tract. A few of the probable diseases are tuberculosis of lungs, chronic bronchitis, bronchiectasis, lung abscess etc. A working idea of the methods of diagnosis of pulmonary tuberculosis in all its stages is very essential as it is the primary duty of the physician to eliminate this disease before a proper diagnosis is made. Chronic non-tuberculous lung infections can and do result secondarily to infections in the upper air passages and can do simulate pulmonary tuberculosis in symptomatology, physical signs, clinical manifestations and X-ray findings. Though it is not a very difficult affair to diagnose tuberculosis of lungs, especially in its advanced stages, yet, its diagnosis in the early stages is beset with a number of difficulties. But, once a methodical and routine examination is instituted, it is easy to eliminate this disease. Especially it is easy, nowadays, because of the X-ray diagnosis being available at every well established hospital. It is as dangerous to diagnose tuberculosis of lung when it does not exist, as to miss one when it is in the lungs. Differential diagnosis between non-tuberculous pulmonary infections and pulmonary tuberculosis is extremely important and sometimes very difficult.

The various problems that arise in such cases may be briefly put thus:—A patient may be suffering from the pulmonary tuberculosis and the diagnosis is easily made. It is possible that this patient was suffering from pulmonary tuberculosis, but after treatment has been keeping good health. Again, he has been having cough and fever. Now, the problem is, 'Is he suffering from the relapse of the original illness or is he having some other infection or is it a combination of both.' Though it is the easiest thing to say that it is a relapse, one has to be very careful before such a pronouncement is made. An otherwise good prognosis may be sadly missed by such a mistake. With the patient under observation for a week or two and with physical examination, laboratory tests and X-rays, it is easy to arrive at a diagnosis of pulmonary tuberculosis.

When we have ruled out pulmonary tuberculosis, we are confronted with further differential diagnosis. We have to determine what pathological changes do exist in the lungs to give the symptoms and abnormal physical signs. Some of the chronic infections which may be responsible for the present condition, may be chronic bronchitis, bronchiectasis, unresolved pneumonia or apical catarrh, lung abscess, Spirochætal infections and syphilis.

Of them, bronchiectasis and lung abscess are easily diagnosed. The history and symptomatology are very characteristic. Sometimes, when the symptoms and physical signs are not very definite, examination of the sputum collected for 24 or 48 hours and kept in a conical glass, helps us in diagnosis. The typical three layers of bronchiectatic sputum can never be missed nor the putty collection of the pus at the bottom of the glass in lung abscess with foul odour could be missed. In addition to this, X-ray helps us to clinch the diagnosis. Small or large cavities with horizontal fluid levels within, with or without consolidation or opacity of the surrounding parenchyma, are indicative of pulmonary abscess. On the other hand, little or nothing abnormal may be made out in a bronchiectatic lung picture. Usually, the only finding is an increase in the width of the trunks running to the bases or to a particular area. With the help of iodised oil, one can visualise the size and shape of the bronchi. Chronic bronchitis is not a diagnosis one should be satisfied with. The causative factor, responsible for this disease as also for bronchiectasis and lung abscess, should be sought for. More often than not, examination of the upper respiratory tract and nasal sinuses will reveal the focus of infection.

The results of a review of 700 cases with chest manifestations and diagnosis by DUNHAM: 574 were admitted as cases of pulmonary tuberculosis, but later examination showed that only 408 were tuberculous and 166 were non-tuberculous. Nasal sinus infection; chronic bronchitis, secondary to infection in upper air passages, secondary to heart disease and secondary to influenza; bronchiectasis—secondary to infection of upper air passages, influenza or empyema were responsible for the symptoms.

Of the 2026 cases that sought admission into P. K. Sanatorium Mysore, between 1932-37, 1833 were diagnosed as cases of tuberculosis of lungs and the rest 193 were non-tuberculous infections of the lungs. They were either bronchiectasis or abscess lung or secondary to influenza. Three cases were diagnosed as syphilis of lungs. Syphilis of lungs is least thought of and it is very difficult to diagnose because of the absence of a definite syndrome. Elimination of the other diseases, a positive blood W. R. and therapeutic results help us in arriving at this diagnosis.

One will wonder if the infection of upper air passages, could be responsible for so much of lung affection. The methods of extension of the infection may be either directly down the lumen and over the mucosa or the air passages into the lung or else by the blood-stream either from the nose and throat or mediastinal lymphnodes. SNOW MILLER has shown definitely by his anatomical studies that infection cannot travel from the nose and throat through the lymphatics in the neck into the mediastinum and directly out into the lung by lymph vessels, because there is no such direct flow of lymph from neck to mediastinum into the lungs.

It is needless to say that diagnosis of pulmonary tuberculosis is very important but at the same time, it is not only the lungs but the whole respiratory tract that must be taken into consideration before a diagnosis is made. X-rays, bronchography with iodised oil will save us from many a mistake in diagnosis and ultimately treatment and prognosis with a correct diagnosis.

Carcinoma Larynx .

BY

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ABOUT 4% of cancer cases involve the larynx. Cancer of the larynx may be classified mainly into four varieties:—

1. *Intrinsic Cancer*:—In this, ventricles, vocal cords, ventricular bands and the inter-arytenoid bands are the starting points.

2. *Sub-glottic Cancer*:—This originates on the inner or under-surface of the vocal cords or the sub-glottic area.

3. *Extrinsic Cancer*:—This group includes cancer growing from the epiglottis, the ary-epiglottic folds, the arytenoids, the pyriform sinuses and the pharyngeal surface of the cricoid cartilage.

4. *Mixed*:—This includes cases, which are a combination of extrinsic and intrinsic and are only seen in an advanced stage and thus the site of origin is difficult to be determined.

Intrinsic cancer grows slowly and for a long time remains localized without much infiltration. Glandular involvement is also late. This is more amenable to surgical treatment than the extrinsic variety in which the course is very rapid and glandular involvement early.

Diagnosis.—In no other internal region of the body does cancer give such an early warning of its occurrence as in the cavity of the larynx. The first and for a long time, the earliest sign is hoarseness which is persistent and progressive. For many months, there is no pain, cough or dysphagia. As the growth increases in size, interference with breathing becomes evident and is followed by dyspnoea. Any adult patient who has chronic hoarseness without symptoms of tuberculosis should have a careful examination made of his larynx to exclude the presence of a new-growth.

Incipient cancer in an otherwise normal larynx has the following distinguishing features. It has none of the appearance of inflammation. The area round the minute excrescence or bulging irregularity of surface may be normal in colour or paler than normal and raised above the surrounding surface. It is rarely pedunculated and is usually flatly sessile and irregular in outline with little or no demarcation from the normal surrounding tissue into which it fades. It may present only broken, warty, abraded appearance. Its base or point of emergence from the normal tissue may exhibit vascular activity as shown by dilated surface venules. Rapid growths often take on a pale yellow or dirty white appearance and suggest in the diminutive, the later well-known cauliflower appearance of malignancy.

Differential Diagnosis.—*Tuberculosis of the Larynx*:—This is a secondary manifestation and some general lesion is always associated with it. The tubercle has no characteristic tendency to involve a certain part of the larynx as is seen in cancer. The lesion may be

single or multiple, most often seen on the arytenoids, the inter-arytenoid space, the vocal process, one or both cords, the epiglottis or in the pharynx. The early pathological changes produce oedema, infiltration and later breaking down with ulceration and secondary infection. The ulceration at first is superficial with later extension into the deeper structures, causing irregular loss of tissue. The vocal cords often present the typical "moth-eaten appearance".

Chronic Laryngitis:—In this there is some oedema or infiltration of one of the vocal cords which in older people may simulate malignancy. But usually some focus of infection may be found in the tonsil, teeth or sinuses, removal of which will clear up the diagnosis.

Syphilis:—Hoarseness may occur in the secondary manifestations of the disease but other general symptoms characteristic of the disease are associated with it. There is uniform infection of both the cords.

Treatment.—"At present there seems to be such a wave of over-enthusiasm for the use of palliative forms of treatment it seems timely to sound a note of warning against the too general acceptance of conservative methods of handling malignant disease. Most patients are reluctant to undergo surgical operations and eagerly grasp an opportunity to take an easier course frequently at the cost of life" (EDWARD A. LOOPER).

The ideal method of treatment is removal by surgical operation.

Laryngofissure:—This operation is indicated in early laryngeal cancer cases in which the growth is limited to the anterior surface or edges of the vocal cord.

Laryngectomy:—This should be done in all cases which have advanced beyond the early stage. In cases which are not very far advanced and the patient's general condition is good, the results from the radical operation are very encouraging.

In all about eight operations for complete laryngectomy were performed and all of them were advanced cases of laryngeal carcinoma. Three of these were cases of intrinsic carcinoma which had gone beyond the early stage and involved the extralaryngeal tissues. The other cases were advanced extrinsic varieties of laryngeal cancer. Out of these, five died soon after operation. Three cases recovered from the effects of the operation. One patient was alive eight years after the operation. After that, he was not seen as he left for his native place. (Vide Fig. 1, 2, 3 and 4.)

The second patient (Vide Fig. 5) died eight months after operation from local recurrence.

The third case had a carcinomatous ulcer involving the pharynx and larynx—a very advanced case. The whole of the pharynx, larynx and cervical portion of the oesophagus were removed in one stage. The patient lived for about 6 months and then died of recurrence in the remaining portion of the cervical oesophagus (Vide Figs. 6 and 7.)



Fig. 1.—Case 1. Patient about four weeks after operation. A fairly big pharyngostome seen in the middle line of the neck.



Fig. 3.—Case 1. About three months after operation. Tubal graft seen at the upper portion of the neck which finally closed the pharyngostome.



Fig. 2.—Case 1. About two months after operation. Tubal graft seen in the lower portion of neck.

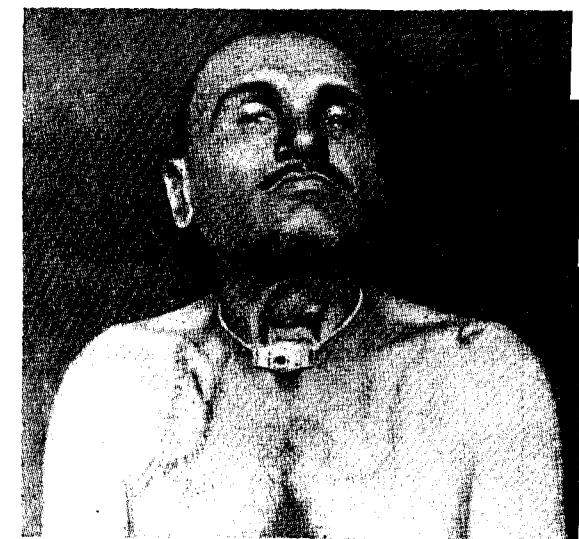


Fig. 4.—Case 1. Patient four years after operation of laryngectomy with the pharyngostome completely closed and much improved in health.

Carcinoma Larynx—By V. M. Kaikini.



Fig. 5.—Case 2. Patient about one month after the operation of complete laryngectomy. The wound healed by first intention and no pharyngostome left behind.



Fig. 6.—Case 3. Patient one month after the operation of laryngectomy and pharyngectomy with a small pharyngeal fistula in the upper portion of the neck. Mark x shows the site of the oesophageal opening.



Fig. 7.—Case 3. Patient about 2 months after the operation for complete laryngectomy and pharyngectomy. The pharyngeal fistula has completely healed. Mark x shows the site of the oesophageal opening in the neck.

Common Cold of Hot Humid Climate— Its Ætiology and Treatment.

BY

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AMONG people living in cities and towns situated in those parts of India where the humidity of the atmosphere is very high, there is a distinct increased incidence of common cold. Common cold is variously named such as catarrh, influenza and 'flu', not only by the public but also by medical men. The subject of common cold has been very intensively studied, particularly in Europe and America, and it was variously attributed to be due to B. influenza, Streptococcus, Staphylococcus and last but not the least to filtrable ultramicroscopic virus. But in India, this subject has not yet been scientifically studied with particular reference to the distinct type predominant among people of those cities and towns where the humidity of the atmosphere is high. This type of common cold is generally met with in persons who keep their bodies always covered by two or three layers of cotton or silk material.

Almost in every family, one or more members are suffering from frequent attacks of cold and fits of sneezing—particularly during the hot season when the atmosphere is very humid. Result of investigation of this type of common cold is recorded here.

Signs and Symptoms.—The patient's description of the attack is as follows:—

In the morning, just on getting up from bed, the patient feels a little heavy in the head and tickling of the nose followed by a bout of sneezing and running of the nose. The same may follow after sitting in the verandah or on the terrace with uncovered body to dry up the perspiration after retiring from work. To sit with uncovered body, after the whole day's work during the hot season, is so pleasant that few can resist the temptation. But after sitting for some time, the patient begins to sneeze and the nose begins to run. With some, there is no further development than such frequent bouts of sneezing and watering of nose. Occasionally, sitting underneath a fan gives rise to a sneezing bout and watering of the nose, or sometimes a glass of cold or iced drink precipitates sneezing and watering of the nose. But with others, the watering of the nose develops into catarrh of the nose and throat. Often, the catarrh spreads into the sinuses producing heavy feeling of the frontal part of the head and nose, and later developing into unbearable frontal headache. The secretion, at first watery, gradually thickens and becomes mucopurulent and subsequently very sticky and yellowish, sometimes with streaks of coagulated blood, evidently from the sinuses. In some patients it clears up gradually, while in others the sinusitis persists for 2 or 3 weeks, giving agonizing

pain. If the catarrh spreads up to the pharynx, there is a painful raw feeling of the throat. Examination shows only congested nasal and pharyngeal mucosa. Culture of nasal swab at the stage of watering of the nose reveals predominantly *Staphylococcus aureus* and *albus*, sometimes in addition a few colonies of *Streptococcus viridans* or *Pneumococcus*, *Micrococcus tetragenous* and *B. pseudo-diphtheria*. Culture of throat swab shows presence of mostly *Streptococcus viridans* or *Pneumococcus*, *Micrococcus catarrhalis*, *B. pseudo-diphtheria* and in a few cases *Streptococcus hæmolyticus*. Later, when the secretion of the nose becomes mucopurulent, culture shows predominantly *Streptococcus viridans* and *Staphylococcus aureus* and *B. pseudo-diphtheria*. In cases with sinusitis with bleeding almost invariably *Streptococcus hæmolyticus* could be isolated from the nasal discharge. The cultural examination reveals no abnormality of the bacterial flora of the nose and throat except that after 2 or 3 days, there is a great increase in the number of micro-organisms as indicated by the great increase in the number of colonies in the culture.

Ætiology.—The cause of common cold of the type met with only in tropical humid climate is not primarily due to bacterial infection. The people who used to remain in naked body, now with the advent of civilisation and exigencies of city life require to dress up properly during the whole day in spite of the sweltering humid heat. Continuous moist heat on the skin dilates the peripheral blood vessels. After getting up from the warm bed in the morning in the cooler air or as soon as the clothes are taken off after coming home from work, the contact of the cooler breeze with the moist skin produces sudden constriction of the peripheral vessels thus increasing the blood flow in the internal organs of the body. The nose and throat having enormous number of blood vessels become at once abnormally congested producing alteration of the secretion of the nasal mucosa. It is common knowledge that the micro-organisms living in the orifices of the body, habitually non-pathogenic, become pathogenic as soon as the secretion of the orifices alter or if there is any alteration in the blood supply of the tissues lining the orifices. Thus, the usually non-pathogenic micro-organisms are transformed into pathogenic ones and a primary congestive catarrh develops later into an infective process. After repeated attacks, the nasal mucosa remains congested even during intervals of attacks. Children who are kept almost always wrapped up by the over-zealous mother or grandmother for fear of catching a chill, even during the warm days, unfortunately often become susceptible and later develop tonsillitis and asthma.

This is the phenomenon of the development of common cold usually met with among people living in humid tropical climate. Absence of this type of common cold among people living in the dry up-country places of Northern or Central India is one of the most corroborative evidences of this process of "common cold". Dry heat does not produce such dilation of the peripheral vessels and, therefore, there is no possibility of sudden constriction leading to abnormal congestion and catarrh of the nasal mucosa. Another corroborative evidence

that patients suffering from frequent attacks of cold in the hot humid climate, become absolutely free from attacks as soon as they go to a dry place. There is a common tendency to attribute this type of cold to Calcium or vitamin D deficiency. Absence of this type of cold among peasants and labourers or their children who rarely cover their bodies does not corroborate this assumption.

Sequel to Common Cold in Children.—Repeated attacks of common cold in children is the precursor of enlarged tonsils and asthma. Mouth breathing starts from blocking of the nose with secretion thus leading to tonsillar infection. In children, catarrh of the nose spreads very quickly to the throat, larynx and bronchii, and repeated attacks of bronchitis lead to asthma. Often, the catarrh spreads through the Eustachian tube to the middle ear, producing otitis media, a very common disease in children.

Treatment.—Usually for such frequent attacks of cold, the nose specialists are consulted by the patients. Often the nose specialist finds "sensitive area" along the inferior turbinate and he attributes the attack to be due to this "sensitive area". He cauterises the mucosa of this sensitive zone and assures the patient that he will be all right now. Unfortunately, that is not the case. Very few go deeper to search for the ætiology. When the patient goes to a physician, he gives him nasal drops, nasal wash, nasal sprays, throat paint. The usual Adrenalin-in-oil spray of different makes, are often prescribed. Unfortunately, all these are only palliative treatments and cannot really cure the disease. Rational treatment must be based on the ætiological factor and in this type of common cold, the pathological condition of nose and throat is only the effect of the primary vascular disturbance.

It is, therefore, important that attempts must be made to remove this vascular disturbance to effect a permanent cure together with palliative treatment. The cause of the vascular disturbance—use of too many coverings during the hot and humid season—must be discontinued. It will probably go against the tradition—but health is more important than useless and unnecessary traditional practice. Collar, tie, coat, shirt and under-vest are not really Indian dress. By mimicking to be a gentleman, the results are:—(1) more money for dress and (2) physical suffering during hot season and, over and above, frequent attacks of cold and sinusitis.

No tight-fitting under-vest should be used during the hot season. One loose shirt should be enough. Physical exercise should be regularly taken during the hot season. This practice diminishes sweating during the rest period. At home, no dress should be put on so that the body can remain somewhat dry. This practice alone has cured many of my patients in the early stage. In one word 'hardening' or 'seasoning' of the body is absolutely necessary to get rid of frequent attacks of cold. Children should be kept without any dress during the whole day and at night a very loose thin dress should be adequate. Morning and evening bath is also very helpful to stop

catching cold. Susceptible individuals should avoid sitting just underneath a swift moving fan. It is better to sit a little away from the fan. The head should be covered by a cap or "pagri". The best medicine which acts almost like a specific is Codiene preparations. Linctus prepared with 1/8 gr. of Codiene per dose thrice daily will invariably stop this type of cold if taken just at the first indication of catarrh. Mixture containing Codiene with Syrup of Vasak also gives very good result. A proprietary preparation called "Riosol" gave us uniformly very good results in this type of cold. This also contains Codiene and Syrup of Vasak as its chief ingredients. If blood examination reveals eosinophilia, a course of 8 or 10 injections of Soamin is indicated. Calcium or vitamin D treatment rarely shows any improvement. Auto-vaccine treatment may give temporary result. Considering the ætiology of the disease, much cannot be expected of Auto-vaccine. Nasal wash, paints, sprays etc. all give only temporary relief. The only medicine to stop its progress is Codiene.

Bronchitis

BY

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BRONCHITIS or the inflammation of the mucous membrane of the bronchi can be clinically divided into acute and chronic.

Acute Bronchitis.—Amongst the predisposing factors are exposure to the sudden changes of the weather, mostly chill and cold, the extremes of life and probably heredity. Often extension of coryza, tonsillitis, laryngitis, and tracheitis causes this condition. It is a frequent accompaniment of whooping cough and acute exanthemata including enteric fever. Exposure to irritating articles *e.g.* particles of cotton and dust or irritating chemicals has the effect of starting inflammation of the bronchial mucosa in predisposed subjects. The exciting cause is most commonly an infection by one or other of the following micro-organisms giving rise to a catarrh of the mucous membrane *viz.*, *Micrococcus catarrhalis*, *Staphylococcus*, *Pneumococcus*, *Friedlander's pneumo-bacillus* etc.

Signs and Symptoms.—On inspection, the respiration appears increased in frequency. On palpation, the rhonchial fremitus is often felt over the back. Percussion as a rule does not give any information. Auscultation reveals dry or moist accompaniments, these becoming progressively moist with the duration of the disease. The onset is marked with cough, malaise, rawness of the chest, heaviness in the head or actual headache, rise of temperature, increased frequency of pulse and respiration and dyspnoea. At the first stage, the cough is dry, the phlegm being sticky and scanty. This is followed by the moist in which the expectoration becomes more or less loose and abundant. The character of the sputum becomes mucopurulent. In the third stage, the cough becomes spasmodic and sputum purulent. In children the signs and symptoms of bronchitis should be watched from day to day as it is often a forerunner of capillary bronchitis or bronchopneumonia; indeed, there is no line of demarcation to show where the one ends and the other begins.

Diagnosis.—The characteristic rhonchi of acute bronchitis can seldom be missed. When they accompany any other disease *e.g.* enteric fever, a correct interpretation should be made; often their presence has proved a pitfall in diagnosis. At the early stages of a case when there is an outbreak of influenza epidemic, the promptness with which the gravity of the common signs and symptoms is realised will determine the treatment and prognosis of the particular case. At the early stages, differentiation from broncho-pneumonia, especially in children, is difficult; in them it is a sequel of acute bronchitis more frequently than some imagine. Dyspnoea, persistently high temperature, resonant percussion notes and fine rales as accompaniments of breath sounds characterise broncho-pneumonia.

Treatment.—At the first stage when the sputum is tenacious, hot drinks are recommended. The bowels which are usually constipated should be opened by a dose of Calomel at night followed by Epsom salts next morning. If there is a distressing rawness of the chest, a single dose of Dover's powder (gr. 10 for adult) seldom fails to give relief. Wines of Ipecac and Antimony are still prescribed by some practitioners with success. Inhalation of Tinc. Benzoin. Comp. Creosote, or Ol. Eucalyptus off a steam kettle proves soothing. In children, a teaspoonful of Ipecac wine when given at the initial stage often acts as an emetic and gives relief. It is the experience of the writer that when acute bronchitis follows tonsillitis or pharyngitis, M and B 693 has a remarkable effect. In the second stage, when the sputum becomes loose, an expectorant mixture containing Ammon. Carb. Vin. Ipecac., Tinc. Scilla. and Inf. Senega is useful; Tinc. Belladonna can be given in place of Ipecac. in this mixture to relieve the spasms of cough. Children can tolerate Belladonna wonderfully well. In the third stage when the sputum is loose but the cough becomes troublesome, Tinc. Camphor. Comp. or Glycoheroin is of great help. The writer often combines Pot. Brom. with Glycoheroin. Syr. Cocillana Comp. is soothing when slowly sipped from a teaspoon.

Chronic Bronchitis.—Most commonly, this is a sequel of the acute form. The causative factors and micro-organisms are much the same as in acute bronchitis; besides these, spirochæta bronchialis is said to be a rare cause. Climate and weather play an important part; recurrence every winter is frequent. The age incidence is past middle life; it claims more victims with advancing years. Gout, diabetes, syphilis, alcoholism and certain heart and kidney conditions have undoubtedly a predisposing effect.

Signs and Symptoms.—Inspection shows signs of emphysema. The thorax gradually becomes barrel-shaped with increased antero-posterior diameter; the apex beat cannot be seen. Looked at from behind the back loses flatness. Persistent cough is always the first to attract attention. The sputum becomes mucopurulent or quite purulent and expulsion in aged people brings relief in the morning. Unless there is an under current of disease, general health is not as a rule impaired. Growing emaciation, progressive weakness, loss of weight, night sweats and evening rise of temperature call for further investigation.

Diagnosis.—If an 'acute' attack lasts for more than four weeks, further investigation is necessary to find out whether tubercle bacilli have established themselves. In the busy out-patients department of district hospitals, cases of chronic bronchitis deserve careful examination. They should be turned over to the tuberculosis clinic where a thorough investigation should be carried out.

In the writer's experience, the commonest cause of persistence of the signs and symptoms of an acute bronchitis is tuberculosis; then comes cardiac failure and last of all bronchiectasis and other

conditions. The changes in the breath sounds with the characteristic accompaniments tell their own tale.

Treatment.—Besides general treatment in order to prevent periodical recurrences, due to changes in weather condition and other causes, measures to treat associated diseases and relieve symptoms are called for. The morning cough is allayed by a saline draught containing Sod. Bicarb. and Sod. Chloride. Lozenges containing volatile oils are soothing; there are several proprietary ones on the market. Mixtures containing Pot. Iod. are useful; some practitioners make sure of the absence of tuberculosis before administering it although a few of the routine formulae used in tuberculosis clinics contain this drug. Tinc. Belladonna is indicated if the cough is paroxysmal. The writer is in the habit of giving Syr. Ferri Iod., Syr. Calc. Hypophosphite Syr. Senna and Glycerine in teaspoonful doses twice after meals; this can be modified if the bowels are not constipated by substituting some other syrup for Senna.

Treatment of associated disease should also be carried out at the same time as that for relieving the symptoms of bronchitis.

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Lobar Pneumonia

BY

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ONE of the common diseases that we meet is pneumonia. It is an acute specific inflammatory disease of the lungs. In about 96% of cases, *Pneumococcus* is the causative micro-organism. In America, medical authors have introduced the term 'pneumonitis' defining thereby certain acute simple inflammatory conditions of lung without any toxæmia. J. MAXWELL has put up a new classification in view of the virulence-resistance ratio thus:—

RESISTANCE TO INFECTION.		RESULT.
GENERAL.	LOCAL.	
Good	Good	Pneumonitis
Good	Bad	Lung abscess
Bad	Good	Pneumonia
Bad	Bad	Septicaemia

Till recently we were in dearth of a terminology by which we could express simple pulmonary inflammations. But in the light of this modern classification, our confusion is minimised.

History.—It appears that pneumonia has been known to the profession and laity since the time of HIPPOCRATES, if not earlier. But there was evident confusion of this disease with other acute diseases of the lung. *e.g.*, pleuritis etc. According to CURT SPRENGELS, DIOKLES of Karystus—a veteran of the yore, was the pioneer who differentiated the pathology of pneumonia and pleuritis. GALEN and others described and dealt with this disease but its true conception dates from the time of HARVEY, SYDENHAM and MALPHIGI. It was MORGAGNI who drew the relation between clinical manifestations outside and the consolidation of lungs inside. The clue to the diagnosis of pneumonia by physical signs was made clear by ANENBRUGGER and LAENNEC. The credit of differentiating lobar pneumonia from lobular one fell to the lot of ROKITANSKY. Its infectious nature was observed by JURGENSEN in 1874 and the causative diplococcus was discovered by STERNBERG and PASTEUR in 1884. Then through research work in Rockefeller Institute at New York, 4 types of this diplococcus were differentiated. Now, thirty two types of pneumococcus have been isolated.

Ætiology.—*Frequency*:—5 to 10 per cent of all deaths.

Age:—Extremes of life are more liable to infections. Common up to 6th year, then incidence falls till puberty to rise again. It is said to be the "Friend of the old".

Sex:—Till 6 years, incidence equal in both sexes, from 15 to 40, Male: Female=2 or 3:1.

Geographical Distribution:—Universal; somewhat less in tropics. Towns are visited more by it.

Social and Economic Status:—It is common in the poor and in those exposed to hardship, undernutrition and exhaustion. *Debilitating diseases e.g.* nephritis, diabetes predispose to it.

Race:—Negroes more liable, as is seen in America and South Africa.

Climate:—Not of much influence.

Season:—Cold and winter seasons have influence on its incidence; maximum in Dec–April. Sudden change in temperature, favours the incidence. Cold and chill commonly regarded as antecedents to infection.

Occupation:—Out-door work shows higher incidence.

Alcohol:—Predisposes and influences the prognosis. *Trauma*—may cause it.

Anæsthetic:—Particularly after ether. Post-anæsthetic ones are usually lobular, massive collapse and infarction.

Previous Attack:—Previous attack only increases susceptibility. I know of a case who had eight attacks and is living now. Modern conception is that an attack confers immunity to that particular type of organism and the other attacks are due to other strains of coccus.

Epidemics:—It is endemic as well as sporadic. But epidemics are also known. Most of the epidemics are not sufficiently studied. The writer has seen six cases in a family, two cases at a time and one following the other. They all succumbed one by one. He also saw three cases in a family and two in another, all are alive.

Exciting Cause:—In 96 per cent the exciting cause is *Pneumococcus* of FRANKEL, in adults. But not infrequently *Streptococcus*, *Staphylococcus*, PFEIFFER's bacillus are also present. American observers show that contacts with types I and II cases harbour these germs for 23 days on an average. They further demonstrate that a convalescent patient may carry pathogenic *Pneumococci* in his mouth for 90 days from the onset of the disease. They also prove that dust of the room in which pneumonia patient has been nursed, contains pathogenic *Pneumococci*. Thus, this confirms that pneumonia is an infectious disease capable of being spread by carriers, by convalescing patients and by dust of rooms.

Clinical Picture.—The clinical picture is too well known. So, I pass it over. One thing draws my attention and it is this, that most of these cases start suddenly at night with a chill and pyrexia. Then

pain and short, dry, ineffective cough set in; usual flush; herpes round the lips or anus or genitals, come in succession. There is a belief that the herpes crop up on that side in which the lung is affected and it is a good prognostic sign. Sputum is viscid and rusty, sometimes hæmoptysis occurs which in no way influences the prognosis. Nervous symptoms are marked in alcoholics and in apical pneumonia. Digestive symptoms may complicate matters. Nausea, vomiting, constipation, anorexia, tympanites, jaundice are a few of them.

In pneumonia, physical signs are the chief guides. A very careful examination is necessary if one is to detect them in the incipient stage. Going through the history of the case, if one cautiously examines the lungs, there is very little chance of over-looking the lesion within. It is needless to go through the technique in detail. Our time-honoured inspection, palpation, percussion and auscultation will lead us properly. Impaired breath sound is the first abnormality to appear and then comes the relative dullness on the affected side. Tubular character of inspiratory sound comes then, afterwards both the sounds are tubular. Sometimes, it has been noticed that the expiratory sound has been tubular first. Vocal fremitus, vocal resonance are increased and pectoriloquy is detected. Usually in 2 or 3 days, signs become confirmative. But in certain cases, the writer has seen signs develop after 6 or 7 days even. It was the pain alone that kept one in the track. Text books are loud to profess that right lung is commonly infected but the writer has seen otherwise. Perhaps the number of cases is equally divided. GHOSH (1933) has 9 in right side and 10 in left side and three (3) in both sides in his series of 22 cases.

Ratio of pulse and respiration is dependable. ABRAHAM finds knee-jerk absent in 24.7% of his cases (*Medical Annual 1932*). GHOSH (1933) in his series detected knee-jerk absent in 4.5% of cases. So, it is not very characteristic.

Radiological Appearance.—GRAHAM HODGSON and his co-workers had studied pneumonia radiologically and they say that when the disease is present, consolidation takes place very rapidly and the opacity is not homogeneous except with very intense consolidation. The first change is increase in density and extent of the hilar shadow on the affected side. The diaphragm rises as much as one or two spaces. There might be slight displacement of heart to the affected side. He describes two types of spread (I) central i.e. extension from hilar region towards the surface and (II) peripheral i.e. the focus starts near the surface and extends towards the hilum. GRAHAM also found that resolution was sometimes complete by the fourteenth day and in most cases by the twentieth, it might be delayed till the fiftieth. Calcification of hilar glands predisposes to delayed resolution.

Prognosis.—One thing comes out in bold relief and it is the difference in mortality between hospital cases and private cases. In the latter, the death rate is certainly less. The movement entailed in removing a patient to the hospital definitely makes the prognosis gloomy in many hospital cases.

Age:—Below 2 years, disease is rare but mortality is high. 2-5, mortality practically nil in uncomplicated cases. Mortality increases with increase of age.

Economic and Social Status Influence prognosis.

Previous Habits and Condition of Health.—1. Alcohol increases death rate;

2. Debilitating Disease:—viz. chronic nephritis, diabetes mellitus cardiac disease, asthma, arteriosclerosis, phthisis, influence adversely.

3. Poor Physique:—Stout or obese and not strong individuals are bad subjects.

Epidemic:—Some epidemics have a high mortality.

Type of Pneumococcus:—Type III is the most virulent. Types I and II account for two-thirds of cases and type II gives the higher mortality.

Other Data:—1. Toxæmia:—It is very well gauged from the face. It outweighs all other factors.

2. Heart and Pulse Conditions:—Pulse rate above 130 is bad. Dilatation of right side is ominous. Cyanosis.

3. Nervous Symptoms:—e.g. Delirium is bad.

4. Temperature:—Extremes are bad.

5. Dyspnoea:—Respiration rate above 50 is gloomy.

6. Leucocytosis:—Absence of it is unfavourable.

7. Blood Pressure:—Falling one is adverse.

Prognosis of pneumonia complicated by meningitis was thought to be absolutely hopeless (PRICE). But cases are on record where it is shown to be otherwise. Clinical assistant of DR. HURST, in Guy's Hospital Gazette, reported a case of recovery. The patient was a girl of 3 years and the diagnosis was confirmed by lumbar puncture and examination of C. S. fluid. Two such other cases also have been recorded in *The British Medical Journal*.

TREATMENT.—To treat a case of pneumonia, just a few points should be remembered. The first is to know that it is a septicæmia. So every organ is put under strain, and our aim should be not to overburden any organ, particularly any vital one—with our treatment. Our constant look-out will be how to give relief to the already worried organs. The second is to mind that pneumonia is a self-limited disease. It has a definite course, short but strenuous. So, if this short period could be tided over with judgment and decision, the life may be saved. It takes its own course and we have only to follow it wakefully. And the third clue is to with-hold ourselves from overtreating the patient. OSLER struck a similar note long ago. But, we have failed to take the cue. Our temptation is to over-drug the patient. This practice is too much prevalent. We run to drug every symptom and sign always with this fear lest that would devitalise our patient all the more and bring death nearer.

General Management :—The very first thing to do is to keep the patient in an airy room. Now, this idea is often not so crystal clear to us. What sort of air should a patient be exposed to? Should a draught be allowed to pass over him? H. L. WALLACE has worked out this so lucidly. In the wards of Children's Hospital in Edinburgh, every case of pneumonia—lobar or lobular—is subjected to an intensive open-air treatment. This is carried out irrespective of the season of the year or of weather conditions with the one exception of fog. Each child is placed in the wind-ward side of the ward beside a widely opened window so that the cold air from without plays direct on the child's face. The essential precaution is, all but the face is adequately clad to prevent chilling. His observation is that sleeplessness, restlessness and anorexia are given a go-by. Patient gets good sleep and appetite. Much of the distress is combated thereby and his energy is conserved. Death rate also is much reduced. It is in patients under two years, 22.4% and over two years 2.5%. In a control series where this cold air was not allowed to blow on the face but continuous oxygen, powerful stimulants and the inhalation of air moistened by steam were given, the mortality rate was in patients under two years 37.5% and over two years 5.8%.

It is interesting to note the physiological back-ground of this therapy. LEONARD HILL (1936) demonstrated that exposure of the face to a current of cold air causes a reflex dilatation of the bronchi and bronchioles and this will promote maximum aeration of lungs.

Following the above experiments on children, the writer took courage in both hands and set in trying this in adults. And to his infinite and gratifying surprise, he notices a revolutionary change in the mortality figure. In every season and weather he has placed such patients in an open verandah where possible or with face near a door or a window where a verandah was not obtainable, with identical clinical improvements. It is for this reason, I believe, such patients do not have much toxic symptoms.

Besides, diligent and intelligent nursing is an important section of treatment. Warm linseed poultice is comforting to the affected side. Counter-irritants may be helpful. Cold may be applied as well.

Diet :—Liquid diet above three pints in 24 hours is essential, milk diluted with barley water, sago water, or Sodium Citrate one grain in an ounce, malted milks, green cocoanut water, sugar candy, glucose, plain water, orange, pomegranate, other citrus fruits, grapes are the usual constituents of dietary. The quantity at a time should be small but should be given frequently. Some favour meat-juice, chicken broth etc. but we usually withhold these.

Specific :—Serum treatment is specific. But to be effective should be given early. Given after the fifth day is useless. FELTOM's serum given after proper typing gives very good results. But the cost is a bar to the average people. BULLOWA and GREENBAUM treated 200 cases. Their death rate with serum was 6.2 per cent and without serum was 17.1 per cent.

Now-a-days, Dagenan (M.&B. 693) is acting as a specific; for the first two days one tablet every four hours, then T.D.S. and gradually B.D. and stopped as the temperature comes down and remains normal for two days. Practitioners are very loud in singing it up.

Medicinal :—A simple alkaline mixture is all that is needed, viz., Pot. Citras, Syrup Aurantii and Aqua. No expectorant is needed as no bronchus is affected usually. Different drugs are needed to combat various signs and symptoms. But, it has been mentioned before that if cold air is available for the face many of the unpleasant symptoms will not turn up at all.

Still, heart failure has got to be met with Coramine 1 c.c. or Caffeine, Sodibenzoas, Adrenalin, Cardiazol or Camphor-in-oil or Ether: Digitalis has its advocates. Leeching or venesection and letting out 15 to 20 ounces of blood in right sided dilatation is a life-saving procedure.

Other Remedies :—Non-specific protein therapy has its scope. The writer has experience with S.U.P. 36 (B.D.H.), Omnadin (BAYER) and Cytodin (Health). He injected during the first four days, daily one of the above preparations till 3 such. In each one of the cases, he has found growing toxæmia practically disappear after 2 or 3 injections. The patient seemed to be almost a normal individual barring his temperature—below 102° F. But the lung signs were present minus all other discomforts. This treatment appeared very encouraging.

Quinine has a reputation as pneumococcicidal. So, its preparation has been used e.g. Optochin and Transpulmin by subcutaneous injection. There has been no evidence of its specific effect.

Artificial pneumothorax has been done in pneumonia and most striking clinical results are prompt relief of pleural pain and dyspnoea, diminution of toxæmia and a critical fall of temperature. The air that is given separates the pleural layer and pain subsides; when the layers come together again after the air is absorbed, no further pain occurs.

An American author treated 104 cases by X-ray. Cases included types I, II, and III. Mortality by it was just under 5%.

A. GOODALL advises intravenous Iodine therapy 10 c.c. of 0.4 per cent. of CROOKE's Collosal Iodine every four hours. Immediate fall of temperature by lysis is a constant feature. He thinks by this, that it is often possible to abort the disease.

Diathermy has been used by some in its treatment with encouraging results.

PROFESSOR WYUN advocated much the use of mixed Vaccine within first 48 or at most 72 hours of onset with very good results. It might abort an attack. But the writer failed to have good results with it. The vaccines were made from Pneumococcus, Influenza bacillus and Streptococcus (P.I.S.). PRICE is of opinion that in cases of delayed resolution, vaccines are more valuable.

Pneumonia has been treated by intravenous Alcohol 22 c.c. 20% solution in normal Saline. Hopeless cases have been recovered by this method, it is said.

Of late, deficiency of vitamin C, has been thought to be the cause of pneumonia. Intensive vitamin C therapy has been advocated by some and they claim good results.

In pneumonia, careful watch should be kept on the circulatory system. Peripheral failure is the rule. Adrenalin, Coramine, Caffeine, Sodibenzoas are competent to overcome it. Strychnine also is helpful. Atropine is a very good stimulant in such cases. Opinion is divided as regards Brandy and its utility in this disease. But alcoholics are in need of it. Brandy in small doses is very useful in diarrhoea. Oxygen helps in cyanosis.

Conclusion.—In fine, it may be put that simplicity in treatment is the secret of success in this disease. Here, I may commit that in every disease a watchful conservatism invariably pays in the long run. Acting on this principle, the writer has had a very low percentage of death. His treatment consists usually of:—

1. Putting patient in an open verandah, day and night, in any weather. In the winter, patient's family members do object to it. So the face is put near an open window.

2. Nourishing diet e.g. milk and sago, glucose very liberally 2-3 ounces a day etc.

3. Calcium Lactate, Potassium Sulpho-Guaiacolate, Quinine (for first 2 or 3 days), Adrenalin, Chloride, Spt. Aether. Syr. Tolu or Vasak in powder and mixture.

4. Brandy 3p-3i every 4 hours from the third or fourth day.

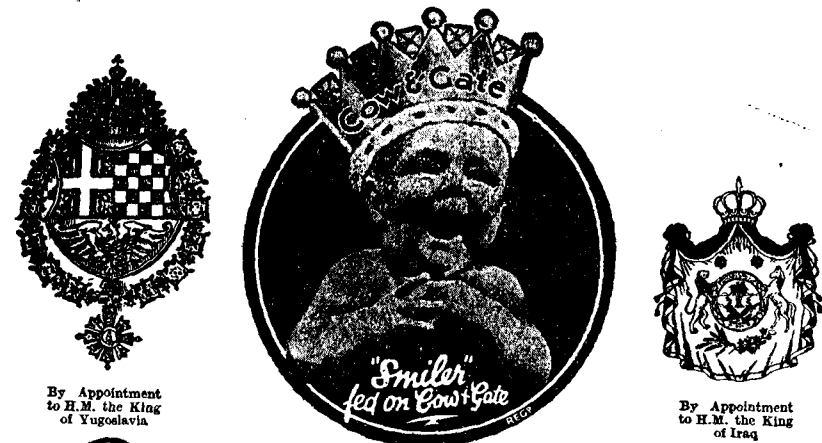
5. Sometimes Oxygen if there is dyspnoea. But when this is advised, it is given very liberally and continuously by nasal catheter, where possible.

6. If circulatory disturbance or failure is detected, Caffeine, Sodibenzoas or Adrenalin or Cardiazol etc. may be given.

Where pneumonia occurred in cases of asthma, the prognosis has invariably been the worst. No amount of treatment has been of any avail. I have seen half a dozen cases with the same result.

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Treatment of Lobar Pneumonia

BY

A. C. Sen, M.B.,

Honorary Associate Physician, Campbell Hospital, Calcutta.

BEFORE discussing the merits and demerits of different curative measures of lobar pneumonia, we must first of all know the nature of the disease and its pathology. Lobar pneumonia is an acute infectious disease caused by the Pneumococcus. Pathologically it is characterised by an exudative inflammation of the lungs and clinically by distinctive local and general signs and symptoms.

Lobar pneumonia may appear as a sporadic, an endemic or an epidemic disease and though it is practically ubiquitous, certain main factors seem to govern its occurrence and spread.

It occurs all over the world but is more frequent in temperate zones and in regions with a wide range of temperature. In North America and in Europe, it causes more deaths than does any other acute infectious disease. There has been a popular belief, since times immemorial, that cold has a lot to do with the causation of lobar pneumonia. But it is probable that the direct influence of cold has been over-estimated and its reaction to subsequent respiratory inflammation may be more casual than causal. No one can deny that chilling of the body surface causes increased exudation in the bronchioles but at the same time it must be admitted that it does not predispose one to lobar pneumonia. Had it been a vital factor, there would not have been a rarity of respiratory diseases among the members of Arctic exploratory expedition and among those who live in the cold regions. Lobar pneumonia is very rare in very cold areas.

Climate and Season:—The incidence of pneumonia shows a marked seasonal variation. It is greatest in winter and in early spring. Less than 20% develop the disease in summer and an equal proportion in the autumn. The most important climatic conditions are abrupt changes in temperature and humidity but the exact influence of cold and moisture is poorly understood.

Sex:—Men are more liable than women to get pneumonia—the proportion being 2 to 1. This difference is probably due to men being more exposed than women and also due to the different type of respiration in the two sexes—thoracico-abdominal in men and thoracic in women.

Age:—Pneumonia occurs at all ages but is very common in ages between twelve to thirty five. Instances of congenital pneumonia are recorded. Mortality is high in two extremes of life—childhood and old age.

Occupation:—In cities, the outdoor workers are more liable to get the attack than the indoor workers. This difference cannot be explained on the basis of exposure alone, because the disease is rare amongst rural people. It is more common in subjects living in overcrowded and insanitary areas.

Whether lobar pneumonia is preceded by any acute infection of the upper respiratory tract cannot possibly be ascertained because in more than 50% of cases, we do not get any accurate history.

Over-exertion and worry are held by some authorities as predisposing factors. This is explained by the fact that over-exertion and worry lower the resistance, hence liability to infection is greater.

That one attack of lobar pneumonia predisposes to a second one, has been the popular conception. MORRIS records a history of repeated attacks in 13.6% of patients he studied. This observation has given rise to the erroneous view that infection with *Pneumococcus* is followed by a predisposition to re-infection rather than any immunity. CECIL and BLAKE have demonstrated experimentally that monkeys convalescent from an infection with one type of the *Pneumococcus* could not be reinfected with the same type of *Pneumococcus* but that they were susceptible to infection with *Pneumococcus* of any of the other types. Thus it has been shown that the immunity and recurrent attacks of pneumonia in the same individual are to be recorded as due, nearly always to different strains of the *Pneumococcus*, each producing specific immunity to the particular strain but not giving rise to immunity to other strains. When several attacks of pneumonia due to the same type of *Pneumococcus* occur in an individual, a focus of chronic infection should be sought for, specially in the upper respiratory tract. As regards alcohol we can safely say that alcoholics are not predisposed to pneumonia but the greater incidence of lobar pneumonia in them can be explained by easy and common exposure they are liable to get, and by the general mode of life of the alcoholic. Lobar pneumonia is the ordinary result of pneumococcal infection but not invariably so, for instance in the very young and also in the very old, broncho-pneumonia is produced by *Pneumococcus* and in them this disease is usually fatal. In these cases of lobar pneumonia which are occasionally found in typhoid fever, *B. typhosus* has been found in their sputum. In influenzal lobar pneumonia, the sputum in 30.6% of cases, reveals *B. Pfeiffer*. Generally speaking, however, we may take *Pneumococcus* as causing lobar pneumonia, since in healthy adults *Pneumococcus* causes lobar pneumonia.

Pneumococcus is a lance-shaped gram-positive diplococcus which, as it occurs in the body, is provided with a well-defined and very resistant capsule. In fluid culture media, the cocci often grow in the form of chains and even in the sputum, chains of some length may be found; virulence depends upon the size of chains.

The recent advance in our knowledge of pneumococcal infection is due almost to a recognition of the fact that although all *Pneumococci* with the exception of *Pneumococcus mucosa* appear identical in morphology and in culture, yet they may be divided into a number of groups or types which differ widely in virulence.

The works and experience of DECHEZ and GILLESPIE and of LISTER of South Africa, have thrown much light in this connection. Of these the first three may be regarded as a fixed type while the fourth is a

heterogenous collection capable of much sub-division. The first three types are highly parasitic, rarely found in healthy mouth while the fourth is present in 50% of healthy mouths. But the parasitic types may also be found in the mouth of healthy persons nursing a patient and they spread the infection as carriers. On an average, we may say that type I accounts for 35%, type II, 25%, type III, 10%, and type IV, 30%; with type I, we have the lowest and type III, the highest mortality. With type IV, 10.23% is the mortality.

We can safely pass one mode of infection. It is transmitted by droplet infection; *Pneumococci* first penetrate the wall of the large bronchi and passing along the lymphatics of the interstitial framework of lungs, they reach the wall of the pulmonary alveoli and finally penetrate into the alveoli themselves. Now inflammatory phenomenon develops in the wake of the invading organisms. The first changes are observed at the hila of the lungs, the wave of inflammation proceeds to follow in a centrifugal direction along the fibrous framework until the periphery is reached.

The *Pneumococci* pass into the blood stream through the lymphatics carried from the bronchioles.

Toxæmia.—It is evident that a patient with lobar pneumonia is suffering from grave toxæmia. In this poisoning, if I am allowed to call it so, it is possible to recognise several factors. One of these, particularly in more severe cases, is bacteræmia, as is evident by presence of *Pneumococci* in blood even late; secondly, a varying degree of anoxæmia. There is still a third one in the shape of toxæmia proper, which may be regarded as a by-product of bacterial infection. Jaundice sometimes occurs in pneumonia which is not due to hæmolytic in the lung, as thought before, but is due to hepatitis. Whether this poisoning causes myocardial degeneration is a matter of dispute; probably no such event takes place; all that happens is muscular embarrassment due to faulty pulmonary circulation.

The most dramatic clinical phenomenon in pneumonia is the crisis and I do not think it would be out of place here to mention something about crisis.

Crisis is more prevalent in sthenic people than in the asthenic. In those cases which terminate by crisis, the patient passes within a few hours from a condition of grave peril to one of complete safety. The sickle of death may have come very near but chemical and immunological forces are at work which may change the entire picture—the temperature may fall as much as 7 to 8° F. in the course of an hour; dyspnoea disappears, respiration returns to normal. The difficulty is to determine what exactly are these forces. It seems that there is a dual process, the parts of which are to some extent at least independent. First, the septicæmia is dealt with by the humoral forces of the body. This is not directly related to crisis, for bacteria disappear from the blood stream some days before that event, while on other hand, BLAKE and CECIL found that local resolution had occurred. The second process is a detoxication which apparently corresponds with

the morphological change which we know as resolution and which coincides with and is responsible for the actual crisis. The problem is still further complicated by the existence of cases in which the lung remained solid for eleven weeks and then cleared perfectly as recorded by certain authorities. The change may be dependent upon the gradual increase in the hydrogen-ion concentration of the exudate to which some have directed particular attention. Whichever may be the mechanism, the local biological change by which toxins are neutralised, the equilibrium of the system is apparently governed by the laws of mass action so that the end result is abrupt—a crisis.

In treating patients with pneumonia, several facts have to be borne in mind—pneumonia is a self-limited disease and depends upon the virulence of the infection and the resisting power of the host. It may present a picture of greatest severity or merely a mild abortive syndrome. The mortality varies in different epidemics, seasons and localities regardless of treatment and the same clinical picture may arise following infection with organisms other than *Pneumococcus*; so, a proper diagnosis is imperative before real treatment.

Now to pass on to real management:—

(1) Isolation.

(2) Patient to be put to bed, sponged regularly and kept scrupulously clean. Rest in bed is imperative. Culture of blood and sputum should be made promptly. Daily or more frequent examinations of the patients are necessary to ascertain the extent and progress of the pulmonary lesion, the degree of intoxication, the condition of the circulatory system and development of complications. Posterior thoracic region should be investigated carefully even in the very ill, otherwise a slight pleural exudate, which is a common complication, may be overlooked. Unnecessary exposure and needless exertion while examining should be avoided.

Sick room should be large, quiet, bright and well-ventilated, windows should be kept open except at the time of examination. The bed should be a single one to facilitate the work of the doctor and nurses. Coverings should be sufficient to protect the patient but not so heavy as to inconvenience him or to interfere with his respiration. The bedwrap should be a light woollen shirt or pyjama, slit entire length to afford easy access for examination. The patient should not be allowed to sit up in bed and the attendants instructed to spare him all efforts. If the patient has to be sent to hospital, he should be disturbed as little as possible. The best position in bed is the one which gives the patient best comfort.

Temperature, pulse and respiration should be charted every two hours, day and night.

The hygiene of the mouth must be scrupulously observed. Frequent antiseptic gargles should be given, teeth cleansed at least twice a day.

Restlessness and chest pain which as a rule are caused by the extension of the inflammation into the pleura may be allayed by Morphine Hydrochlor gr. 1/6 and Atropine Sulph. gr. 1/130 hypodermically, provided there is no renal or hepatic involvement. Bromide in gr. xv doses every 4 hours combined with Brandy 1 dr. every 6 hours will also soothe the patient. Cough is a symptom which requires medication only when it is harassing. To check repeated unproductive paroxysms: Codeine Sulph. gr. $\frac{1}{8}$ — $\frac{1}{4}$, Heroin Hydrochlor gr. 1/12 or Morphine gr. $\frac{1}{8}$ may be given hypodermically. Of these, Heroin has got to be used with great caution. Expectorants are of little value. Mild laxatives may be given at the onset and afterwards, constipation, if any, should be treated with soap-water or glycerine enema.

Particular attention should be given to the out-put of urine in 24 hours. Plain water and milk are the best diuretics known. Hydrotherapeutic measures are invaluable in the treatment of pneumonia—water by mouth acts as a diuretic—hence an eliminant of toxin. Spongings bring about a lowering of temperature with concomitant diminution of discomfort and through the use of these nervous system is calmed, the circulation is aided, respiration is stimulated and elimination through sebaceous pores is facilitated. In fact, in pneumonia, there is no necessity to look for antipyretics except in case of hyperpyrexia, which can also be controlled by cold sponging.

It has been the practice to give brandy in drachm doses every 6—8 hours in case of pneumonia. Brandy should not come as a routine measure. It should not be given in cases, where there is hepatic involvement. It is certainly of great value in cyanosis, respiratory embarrassment, restlessness and insomnia. If there be symptoms of chill, brandy and even whisky can be given, if covering with hot blankets and electric cradle is not enough.

Expectorants and diaphoretics should not be given as a routine measure. Expectorant in the early stage, i.e., before resolution has started does more harm than good, but as there is sufficient amount of tissue combustion, it is always desirable rather beneficial to give a simple alkaline mixture containing:—

Sodi. Bicarb	...	gr. x
Pot. Citras	...	gr. x. t. d. s.

It not only replaces the buffer substances lost during tissue combustion at the height of fever, but also acts as a diuretic.

Evidence concerning the value of oxygen as a therapeutic agent in pneumonia is contradictory, due to (i) failure to clearly recognise the indication for its utilisation and (ii) to the faulty method of administration. Observations have shown the prognostic significance of anoxæmia in pneumonia, and have established its presence as a primary indication for administration of oxygen. Cyanosis is a definite indication for administration of oxygen. Experience has taught us that the inhalation of a gas from a mask or from a funnel fails to relieve the need. Therefore, the amount of concentration of

oxygen is not sufficient in the inspired air taken in along with the oxygen by this method. So, administration of oxygen, if given at all, should be given by a nasal tube, in mild and moderate degree of arterial unsaturation, but often this method also fails, because in this method the discomfort caused over-rides the beneficial effect obtained by putting the oxygen. To be truly helpful, oxygen in the concentration of 40 to 60% is needed, and this may be had in the chamber or in a room such as is devised by STADIE or in a portable tent made according to the plan of BARACH and BINGER. Although, often evidences of improvement are manifested promptly after instituting the treatment, *e.g.*, lessening of disappearance of cyanosis, a fall of temperature, slowing of pulse, diminution in the respiratory distress, promotion of sleep, decrease in the delirium, prolonged treatment may be needed to completely overcome anoxæmia. It is to be emphasised that this therapeutic measure is supportive and not curative and that it has the greatest value if utilized as soon as the earliest symptoms of insufficient oxygenation of blood are manifested. In this connection I would like to mention emphatically about the aero-therapy. The room must be well-ventilated with big surface area and a good number of windows all open—the temperature of the room being kept at 60°F. (15.7°C.). There must, on no account, be overcrowding of the patient's room. If possible, one patient should be in one room with one attendant only.

Now, comes the question of Digitalis—one school holds that Digitalis has no effect on pneumonia-heart, as the heart musculature is damaged by the endotoxins of *Pneumococcus*. In lobar pneumonia, there is practically no muscle damage, but the heart muscles are embarrassed by the congestion and dilatation of the right heart due to deficient circulation in the pulmonary area, the pulmonary capillaries are damaged. If there is congestive failure, there cannot be any two opinions as to the good effect of Digitalis; of course, in pneumonia, peripheral failure is a more common event. Our experience is that 10 ms. of Tr. Digitalis along with an alkaline mixture t. d. s. improves the picture considerably and the rationale of this, in our mind and as proved by our experience, is that Digitalis increases the diastole thereby diminishes the already increased pulse rate and improves the blood condition in the pulmonary area. This can safely be carried on till toxic symptoms appear. In about 23 cases there is a simultaneous fall of temperature along with direct fall in the pulse rate. If Digitalis therapy does not prove effective, we shall have to take recourse to Strophanthin. In case of congestive failure of the heart, when there is definite dilatation of heart and signs of congestive failure, venesection should be done—about 250 to 500 c.c. of blood should be taken out from the vein. If there be sign of oedema at the base of the lungs, Atropine is a good accessory. It can be given orally or subcutaneously in 1/100 to 1/150 gr. dose. It may be repeated every four hours. The value of Strychnine in stimulating the circulation in lobar pneumonia is doubtful. Caffeine Sodii Benzoas gr. 3 or Epinephrin m 10 to 15 may be given hypodermically, when a rapid and transitory stimulation is desired. Camphor-in-oil, Camphor-in-ether, Cardiazol,

Coramine, Metnazol are always given to revive circulatory failure, their effect is also very transitory. In fact, these may be considered as producing the last flicker.

Spt. Ammon Aromat may be useful at times when cardiac palpitation accompanies abdominal distension or nausea.

When symptoms of vasomotor collapse supervene, it is helpful to elevate the footend of the bed, to give centripetal massage of the lower extremities and injection of Epinephrine 5 c.c. every hour or Pituitrin .5 to 1 c.c. Now, in regard to the question of toxæmia which should be dealt with by aero-therapy, hydrotherapy and eliminants, the best and most prompt eliminant is Glucose which may be given by mouth if possible or better by the intravenous route in 25% solution at least 50 c.c., b.d. or, 100 c.c., i.m. If the degree of toxæmia is too severe, 5% Glucose saline may be given subcutaneously. According to some, Calcium has the property to increase osmosis of tissues and thereby acts as a good diuretic. With this idea, Calcium is to be given in cases of toxæmia. The best preparation of Calcium to be given is Calciumparathyroid. One school advocates the use of Calcium from the very beginning with the idea that calcium retards inflammatory process. Alkali also promotes diuresis and hence is an eliminant. About Iodides, we do not find any effect of Iodide on lobar pneumonia. It might be useful in delayed resolution and even there, we get more available nascent Iodine by intravenous Iodine therapy and not by Iodide orally.

About counter-irritant in the form of poultice, Antiphlogistin etc., we can safely say that they will do more harm than good by putting the patient to some discomfort. If there be too much of pain in the chest due to pleural involvement, we can strap the part but thereby there is also the danger of immobilising the lungs; our experience tells us not to disturb the patient by counter-irritants.

Specific Therapy.—A large number of patients with pneumonia have been treated with anti-serum but only one group of cases respond to this therapy *viz.*, group I in which, if serum is given early *i.e.*, within the first three days, very encouraging results might be obtained. In fact, in 1933, we tried this therapy in 10 of our cases and in all of them, the temperature came down by lysis on the 6th or 8th day and the toxæmia disappeared, considerably after the first dose and completely after the 3rd dose. Serum therapy is a complete failure in group III and IV and fairly good in group II, but not definitely so.

Sulphonamide group of drugs have been extensively used at the present day for treatment of lobar pneumonia. M. & B. 693, which is the penta-derivative of this group, is the drug of choice. Sulphonamide group of drugs has got no bactericidal effect but it acts by its bacteristatic effect and by virtue of its power to dissolve the resisting capsule of the *Pneumococcus*. It has really been a definite improvement on the treatment of lobar pneumonia. Group III which is the most virulent form on account of its very resistant capsule, is

acted upon very nicely by the Sulphonamide. After the capsules are dissolved, antibodies in the system get better scope to fight the organisms. The disadvantage of this group is that the course has got to be continued for at least four days in two tablets a dose—three times a day—all told the patient must have 40 grms. either orally or by injection. While the course of sulphonamide is being given, the patient should not be allowed to take anything containing sulphur or its derivatives.

The American school holds that Sodi, Salicylas in 15 gr. dissolved in 10 c.c. of distilled water injected intravenously, has got a definite curative action on lobar pneumonia, but we do not find any rationale for this treatment. Probably, those cases which develop lobar pneumonia as a secondary involvement in influenza improve as Sodi-Salicylas is specific for B. Pfeiffer.

Only a few months back, the practitioners of the city of Calcutta used to advocate non-specific protein therapy. Though the line of treatment has not got a definite curative action, it is certainly a curative measure because by the administration of non-specific protein, reticulo-endothelial system gets stirred and the phagocytosis is much accelerated.

Pneumococcal Vaccine, I dare say, has practically no beneficial effects.

Now as to the question of diet, which is the last but not the least thing to consider, administration of fluid intake must be very liberal. The course of the disease is so short that the question of inanition does not come in at all, food that is given must be properly and easily digestible and assimilable. Milk is the best diet known. Milk sometimes gives rise to distension of the stomach. If it produces distension, milk should be peptonised or butter milk should be given; fruit-juice must be given both as a food and as a vitamin; some authorities say that there is some salt deprivation in lobar pneumonia; so it is always safe to add 15 to 20 gr. of Sodi-Chloride to the diet. Barley water and Glucose water should be given *ad lib*, but distension of the stomach should be watched and avoided. Though Glucose is a mono-saccharide, it is sometimes found to give rise to distension.

Albumin-water and jugsoup (Jugchicken) may also be given. I myself would much prefer vegetable soup to chicken soup, because vegetables produce more alkaline ash.

Before concluding this paper, I would indeed be failing in my duty if I do not express my deep sense of gratitude to my revered teachers and patrons LT. COL. B. G. MALLA, I.M.S., Superintendent, Campbell Medical School and Hospital, and Khan Sahib Dr. K. Hossain, M.B., D.T.M., Teacher of Medicine, Campbell Medical School, for their kind help and suggestions.

Abscess of the Lung

BY

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WHEN faced with the diagnosis and treatment of an acute pulmonary condition, the general practitioner, quite rightly, usually diagnoses pneumonia or bronchitis. The acute stage of both these conditions passes off in a few days. When, however, the patient continues to be seriously ill, two other possibilities suggest themselves. Firstly, the patient may now have the complication of empyema. Careful clinical examination, including aspiration and sometimes a radiograph, will confirm this diagnosis. Secondly, when the patient continues to run a temperature and to cough up sputum, the diagnosis of acute tuberculosis presents itself forcibly to the mind of the doctor. A specimen of sputum is stained and examined, all too frequently, by some one unaccustomed to carry out this form of examination, and an incorrect report of tubercle bacilli in the sputum is returned. This report condemns the patient to the very gloomy outlook of pulmonary tuberculosis. Then, as he is so ill that it seems he may die, he and his relatives decide that he shall be treated at home; or, even if he agrees to the proposition of sanatorium treatment, this may not be available. So, expectant treatment is carried out, as well as possible, at home.

Such cases are often neither empyema nor pulmonary tuberculosis but lung abscess. To emphasise the fact that this is by no means an uncommon, out of the way condition, here are the comparative figures for empyema and lung abscess in the surgical wards of the King George Hospital, during 1940:—

Empyema : 4; Lung abscess : 7.

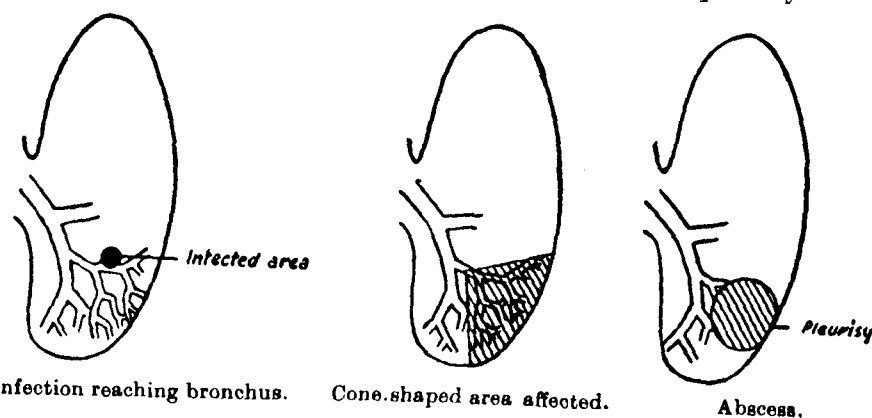
Lung abscess is certainly a serious condition, but it is one that is amenable to active surgical treatment without which the ultimate outcome is almost sure to be fatal.

The clinical diagnosis of lung abscess is difficult. The history is sometimes suggestive. The patient may have suffered from lobar pneumonia, five or six weeks previously, recovered more or less, and then had a return of fever, cough, sputum, and pain in the chest. The sputum may be large in amount and foul smelling. Sometimes, the history is one of inhaling a foreign body after an operation under general anaesthesia, the foreign substance being either vomitus or infected material from tonsils, mouth or air sinuses. A third variety of history is one of long continued lung trouble with the coughing up of three to four ounces of sputum, especially the first thing in the morning. Subsequently, the lung symptoms become exaggerated and the patient's general condition deteriorates. This suggests the diagnosis of a lung abscess supervening on established bronchiectasis.

But, whatever the cause, the patient suffering from an abscess of the lung has the following symptoms. He has fever, cough with

sputum, and frequently chest pain and dyspnoea. Fever is always present and may be sustained or irregular. There is no diagnostic type of temperature chart as so many factors influence the temperature. The cough may be very distressing, allowing the patient no rest. In an early case of lung abscess, the amount of sputum may not be very much, but in a late case, the quantity is usually four to eight ounces daily. The assumption of a certain position may cause a severe bout of coughing and the production of much sputum. This is caused by the contents of the abscess cavity pouring into a communicating bronchus. If there is much sputum, there is generally a mixed infection present, and the sputum and the patient's breath have a particularly offensive odour. This is very distressing for the patient and his attendants. Gangrenous pieces of lung may, sometimes, be identified by the naked eye in the sputum, and microscopically, elastic fibrils from broken-down lung tissue are present.

The chest pain is usually of the pleuritic type and often accurately localised. It is due to a small patch of pleurisy. In the formation of a lung abscess, infection starts in a small bronchus, or bronchiole, or in the lung tissue. As the infective process progresses, infection will reach a bronchus and then spreading down the bronchial tree towards the periphery, will involve a cone-shaped area of lung tissue, with its base towards the pleural surface. It is here the pleurisy occurs.



The chest pain, the loss of the functioning lung tissue and the debility and anæmia, lead to dyspnoea. This may be so severe that orthopnoea is present.

On physical examination of the chest, some or all of the following signs may be found. Movements are decreased on the affected side. An area of dullness may be found. This is not well defined but is usually in the upper part of the chest. On auscultation, signs of consolidation of the lung tissue and varying moist sounds surrounding a patch of bronchial breathing may be present. A succussion splash may be heard. Only rarely, and in a very late case, the abscess cavity is big enough for the coin test to be positive. The signs may be merely those of a small patch of consolidation, or if the

abscess is deeply hidden, or is adjacent to the mediastinum or an intra-lobar cleft, even these signs may not be found. Diagnostic aspiration should not be done. The pleural cavity is healthy except for the very small area at the base of the abscess, where the visceral and parietal layers are glued together by inflammatory adhesions. A needle inserted through the unaffected pleural space into the abscess, when withdrawn, brings with it infective material and leaves a track straight into the pleural cavity. A generalised empyema results and this, complicating an already serious condition, is almost certain to be fatal.

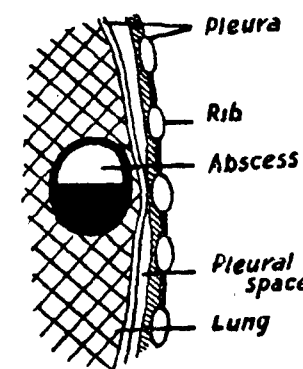
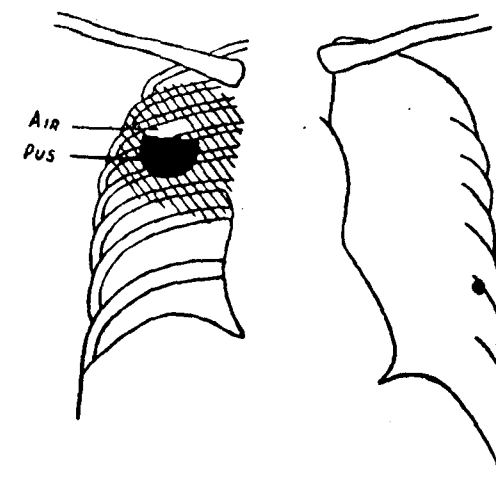


Diagram showing small area of pleural adhesion.

The sputum should be sent for bacteriological examination but too much reliance must not be placed on this report, and indeed whatever the report, X-ray examination is essential. Radiologically in an early case on screening, or on examination of a film, one sees a rounded shadow, dense at the centre and with a hazy outline. In an antero-posterior view, this may appear central in the lung tissue but in a lateral or oblique view, it is seen to be on the periphery. Later, the picture is still more definite. Pus is formed. A fluid level is clearly seen, and the fluid is dark in contrast with the area above. In a big abscess with a large communicating bronchus, ripples pass over the surface of the

fluid as changes in the intra-bronchial pressure occur. Careful screening in various positions will show the abscess reaching the pleural surface of the lung. The tomograph is particularly well adapted for accurate localisation of such an abscess.

Careful and accurate localisation of the abscess is the first and an essential step in treatment. A small abscess with a history of less than 6 or 8 weeks, may be treated medically (postural drainage etc.), but at the same time, regular X-ray examinations should be made and if the size of the abscess is not diminishing appreciably and rapidly, sputum disappearing, and the temperature remaining normal, it is unwise to let the patient's general condition deteriorate further, before giving him the chance of recovery afforded by operation.



Line drawing from a radiograph. Abscess surrounded by inflamed lung tissue.

Operative treatment consists in removing, preferably under local anæsthesia, the rib or ribs immediately over the abscess. After reflecting the periosteum beneath the ribs, the parietal pleura is inspected, and in most cases, is seen to show some evidence of the underlying abscess. This evidence may be slight and consists in some loss of translucency and sometimes in the thickening of the pleura. Often, the only sign, that the correct area has been found, is the absence of the movement of lung beneath the pleura. A wide, bore needle is inserted through this area in the direction of the abscess cavity, and the presence of pus confirmed by aspiration. The pleura or lung is then incised and the abscess opened. The abscess cavity is inspected by direct vision and digitally, and a sufficient area of its outer wall removed for adequate drainage. It is lightly packed with Flavine gauze.

After operation, there is usually a rapid improvement in the temperature, cough, and general health of the patient, and then a somewhat slow convalescence follows. This is to be expected as the walls of the abscess cavity are composed of lung tissue moving with respiration, which makes rest to the affected part an impossibility. Another factor in slowing the healing process is the inevitable presence of a bronchial fistula. This is not to be looked on as a complication, but is in fact beneficial in that it ensures aeration of the abscess cavity, and thus prevents the growth of anærobic bacteria. The wound is carefully packed and made to heal from the bottom, four to six weeks being the usual time needed.

To summarise the important points in this article: Lung abscess is a fairly common condition. It should be suspected in a case of lung disease, which has persisted more than three weeks and steps should be taken to verify the diagnosis. An expert radiological examination is essential and should consist of direct screening of the patient in various positions as well as the examination of films. When the diagnosis of lung abscess has been made, the adage "where there is pus, let it out" applies, and the surgeon takes charge.

It is most advisable not to wait too long in these cases. When the clinical diagnosis is obvious, the patient may be so debilitated that whatever the treatment, the end is certain, i.e., whether the treatment be operative or non-operative, he will die.

Early diagnosis, radiological examination by an experienced radiologist, and surgery at the most opportune time, offer the patient his best and often his only chance of life and health.

Whooping Cough—Its Treatment

BY

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THE characteristic paroxysms of whooping cough are almost pathognomonic of the disease, but they develop later in the course of the disease, usually after one to three weeks after the disease has taken hold.

Sometimes in infants, the fully developed whoop is absent and there are only paroxysms of short coughs of varying duration. The characteristic crowing inspiration is absent.

Whooping cough is caused by a small Gram-negative bacillus, *Hæmophilus pertussis*, (bacillus of BORDET and GENGOU) and the average incubation period of the disease is one to three weeks.

While both sexes are equally susceptible and the greatest incidence is in childhood and infancy, adults do not entirely escape the disease.

Again, one attack usually gives sufficient immunity, but repeated attacks of lesser severity have been noticed in every epidemic.

It has an epidemic form and is prevalent in certain seasons.

These points are well known to every doctor, but they are stressed simply for the purpose of arriving at an early diagnosis, when only effective preventive or abortive treatment is possible. Later on, when the disease is well established, it usually runs its course.

It should be remembered that the period of infectivity is about six weeks from the beginning of the whoop.

Clinical Picture and Diagnosis.—Diagnosis of whooping cough, though very easy in its fully developed stage, is often missed in its early stages. Early diagnosis will make the treatment easier. The disease starts insidiously, like ordinary cold in the head. This stage lasts about one week or ten days with running from the nose and a little redness in the eyes. Physical signs are few or none. Throat is slightly congested, chest is clear or a few rales may be present. The patient starts his cough towards the end of this stage but without whoop. It is always jerky with several short ones in a single expiration. The diagnosis should always be made in this stage and one should look for incidences in the family, neighbours and schools. This investigation will more often help a correct diagnosis. Parents will surprisingly supply the informations.

It is not necessary to go into the details of a typical paroxysm which is well known to all physicians. It needs mentioning here that symptoms in infancy are not the same. They seldom have a typical whoop, though paroxysm is the same. Vomiting is more prominent in infancy with convulsion as a complication. It may be stated here that G. GAJZAGO and O. GORTONE investigated adults as carriers of

whooping cough and confirmed it by serological complement-fixation test.

Treatment.—*Preventive*:—Isolation of patients is very important but at times is quite impossible except in cases of infants. Older children are difficult to be isolated in houses as the constitutional symptoms are light and patients cannot be confined to bed.

Prophylactic:—Vaccines are most important. There are several vaccines on the market, but I find very satisfactory results with two or three of them.

They are: (1) Dissolved vaccine (GLAXO LAB). 10,000 mill. per c.c. (2) Patein (SCHERING) 20,000 mill. per c.c. (3) Whooping Cough Mixed Vaccine (P.D. & Co).

The first two are not mixed vaccines, but contain different strains of the bacilli. Three to four injections are necessary and, if given in time to the contacts, the attack will be completely avoided.

I have recorded the value of the 1st two vaccines in eleven different families. The infants and children, of ages between three months and eight years, were injected. They were allowed to mix freely, play about and sleep in the same room without causing any other incidence. Only two cases had catarrh of the nose, slight fever and cough. These disappeared before the full course was given; the total number of contacts being forty-two in eleven families.

In an elaborate investigation in Brooklyn by SEIGEL, he did not find any prophylactic value of vaccine in mass inoculation over two thousand cases. But it was observed in New York that eighty billion Bacilli of Sauer's or New York Health Department vaccine has good effect, and better results were obtained with still higher doses. So, in using prophylactic vaccine, one should be sure of the amount and the dosage.

Convalescent Serum:—Its value to give passive immunity has been differently reported, but, as the process is cumbersome in private practice, I think it is useless to try this now-a-days.

Symptomatic Treatment.—*General*:—Patient should be confined to bed, properly fed and nursed, to avoid complication and prolonged ill-health after an attack. Warm bed in a well-ventilated room or open air, if weather permits, is advised. Visitors with cough and bad throat, should be barred. He should be kept well humoured, as a change of temperament will often cause a paroxysm.

Diet should be light, nutritious and semi-solid or liquid. They should be given in small quantities and frequently. Feeding is not difficult but the cough with vomiting interferes with its retention. Feeds, if given after a paroxysm or vomiting, will be retained better. Wholesome and correct feeding is necessary for this illness of long duration.

Medicinal Treatment.—A large number of drugs are prescribed, and they can be classed under the following groups.

Drugs of anti-spasmodic nature, such as Ephedrine, Belladonna, Benzyl-benzoate, Bromoform, and Chloretone.

Drugs which are general nerve sedatives, as Bromides, Phynazone, Chloral, Codeine and Chloroform; gastric sedatives like Acid Hydrocyanic Dil. are also prescribed; drugs which cause expectoration, as Vinum Ipec., Sodium Benzoate, Iodides. Lastly a few authors recommend antiseptics as Carbolic Acid, Quinine, and Garlic.

Combinations of drugs of different groups will be found more helpful and a few prescriptions are given below.

Vitamin C, as to its curative value, has been investigated by D. GAIRDNER and OTANI on the basis that addition of vitamin C to the solid medium inhibits the growth of H. Pertussis. The result is not encouraging though the patient's general health was better, weight increased and convalescence was shorter.

Vitamin D was also investigated by HAUSEN and the results were not conclusive. Vaccines, given in catarrhal stage or early whoop-stage, will cut short the frequency of whoop and total duration of illness.

Ultra-Violet Irradiation to the whole body, three times a week, is also recommended but its value separately cannot be ascertained. It is probably more useful during the convalescence. Change of place will often cause a surprising diminution of paroxysms.

Convalescence:—Child should be carefully nursed through this period with proper attention to diet. Tonics with vitamins A and B, iron, strychnine are indicated. Careful observation should be kept on the lungs as pulmonary tuberculosis is not uncommon after whooping cough. Nose and throat should be treated if an inflammation is found there.

Complications:—Commonest is broncho-pneumonia and should be treated in the usual way. Laryngospasm is treated with Amylnitrite, Ammonia and Chloroform. Convulsions are treated with Chloroform, Chloral Hydrate and hot bath. Hæmorrhages as epistaxis, hæmoptysis and sub-conjunctival hæmorrhage need no special treatment.

Prescriptions for Whooping Cough

The following prescriptions are useful for one-year-old child.

- | | | | |
|------------------------------|-----------------------|---------------------------------|----------------------|
| (1) $\mathcal{R}$ Antipyrine | gr. $\frac{1}{2}$. | (3) $\mathcal{R}$ Acid Carbolic | gr. $\frac{1}{4}$. |
| Tr. Belladonna | m iii. | Spt. Vin. Recti. | m ii. |
| Sodi. Bromide | gr. $1\frac{1}{2}$. | Tr. Iodine | m ss. |
| Vin. Ipec. | m iii. | Aqua Menth. Pip | ad $\mathfrak{z}$ i. |
| Syp. Tolu. | m x. | | |
| Acid. Hydrocyanic Dil | m $\frac{1}{2}$. | | |
| Aqua Chloroform | ad. $\mathfrak{z}$ i. | | |
| | Every 4 hours. | | |
| (2) $\mathcal{R}$ Phenazone | gr. 1. | (4) $\mathcal{R}$ Syp. Codeine | m x. |
| Sodi. Bromide | gr. ii p. | Syp. Prun. Virgini | m x. |
| Tr. Belladonna | m ii p. | Syp. Cosome (Merck) | m xxv. |
| Aqua | ad. $\mathfrak{z}$ i. | Aqua | ad $\mathfrak{z}$ i. |
| | Every 4 hours. | | |
| | | | Every 4 hours. |

Pleurisy with Effusion

BY

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THE formation of fluid in the pleural cavity, which under normal conditions, is a potential cavity only, occurs as a response of this membrane to abnormal stimuli, and can obviously occur in widely varying conditions. Its origin may be due to infective, traumatic or mechanical causes. It may arise as a primary affection, or in the course of metabolic diseases like nephritis, general diseases like septicæmia, anæmia or new growth. This article is mainly concerned with cases of infective nature. When trying to find out the causal nature of the infection, it is safer in practice, to assume that all cases are tubercular, unless it is proved otherwise. The utility and wisdom of this assumption will be evident, when it is recalled that in a very large majority of cases, pleurisy with effusion is a primary affection and occurs at a time, when lung involvement, if it exists at all, is very insignificant: and consequently, such state of affairs affords best chances for treatment and complete cure. This attitude is not unnecessarily panicky, but, on the contrary, is more than justified by the after-history of such cases of primary pleurisy, the tuberculin reaction of such patients, and cytological cum bacteriological examination of the exudate in such cases. Such attitude would have been universal and unchallenged, had it not been for the small percentage of cases, which are truly and undoubtedly rheumatic in origin. The constitution and diathesis also of the patients of both these groups, have many common points. The distinction between these two groups is, indeed, very difficult. Rheumatic cases are generally rapid in their course, the exudation and filling of fluid occurring quickly, and absorption also following equally quickly. The characteristics of infections with other organisms are fairly distinct. Pneumonia, lobar or lobular, may be complicated by effusion. Pneumonia is not always due to Pneumococci, but may be due to Streptococci and Bacillus influenza. Also, it may happen that effusion occurs without a frank attack of pneumonia. Effusion due to Pneumococci, generally occurs at a time, when attack of clinical pneumonia is over, and the fluid is generally purulent. Cases due to Streptococci and Bacillus influenza show evidence of formation of fluid when the clinical pneumonia is not over, but is developing. Lung consolidation and exudation of fluid occur almost simultaneously, and co-exist. The nature of the fluid is generally sero-fibrinous, but its formation is usually rapid.

The common channels, through which the infection reaches the pleural cavity, are from the lung, from below the diaphragm, and from the blood-stream. Some lung conditions make the pleural cavity more vulnerable, and bronchiectasis, tumours and pneumonia are some of such conditions. Effusion may occur in cases of septicæmia, but this is generally accompanied by pneumonia; effusion may occur alone. Possibility of infection through blood-stream does exist, but is

not quite common. Infection can spread upwards from abdominal lesions through the diaphragm towards the pleural cavity, but it is to be remembered that the reverse does never occur. When they co-exist, effusion supervening on the sub-phrenic abscess, and the case is seen for the first time at this time, it often happens that pleural effusion is correctly diagnosed, but the sub-phrenic abscess is missed, with the disastrous result, that the effusion is considered primary and treated, while the abdominal condition, which is really the source of the trouble, and a far greater and a serious affection, receives no treatment.

Pathology.—It is unnecessary, here, to enter into purely pathological considerations. However, from clinical point of view, two points require stressing; firstly, there is exudation of fluid, the quantity and character varying within wide limits and secondly, consequent on the first, there is a disturbance of equilibrium of intra-thoracic pressure on two sides. The fluid exerts pressure on surrounding organs, lungs, heart, spleen or liver and mediastinum. The lung collapses, and by its own inherent elasticity, retracts towards its mediastinal attachment. A stage may come when the fluid not only abolishes negative intra-pleural pressure, but starts exerting positive pressure. Hyperæmia of the other lung may, often with the fatal termination of acute pulmonary oedema, supervene.

The character of the fluid may be serous, semi-purulent, frankly purulent or bloody. The cytological examination is very helpful, and reveals three kinds of cells, viz., polymorpho-nuclear, lymphocyte, and eosinophile. The significance of each is different. The preponderance of polymorphs over others, suggests infection by pyogenic organisms: of lymphocytes points towards a chronic infection, probably, tubercular in nature. The significance of eosinophil is not so clear, but it is in between fulminating, acute, pyogenic and smouldering chronic tubercular infections. Their presence, generally, forecasts that the effusion will not become purulent, and on the whole, the prognosis is favourable.

The bacteriological and cultural methods are necessary in finding out the exact nature of the offending organisms. It may be necessary to do guinea-pig inoculation, but it is said that in early cases, it is negative.

Symptoms and Signs.—All the classical signs and symptoms need not be enumerated here. But, certain important points are touched upon. Pain is quite severe in acute dry pleurisy, but the attack may be so mild, that it is completely absent, hardly remembered, or wrongly labelled as due to exposure and lightly ignored by the patient. It is not rare, that a patient with his one side full of fluid, hardly remembers any previous attack of sharp pain, but complains and comes under care for some other symptom. Again, in chronic pleurisy, pain is complained of, but in different situations. It may be referred to upper abdomen, and many resemble colic. However, simple colic, without any complication is never accompanied by fever. In cases of

diaphragmatic pleurisy, there may be even rigidity and tenderness of the abdominal wall. Pain may also be complained of in the shoulder region, and root of the neck. Such pain is referred pain. The diaphragm has a double nerve supply. The central part is supplied by the phrenic, and the lateral part by the inter-costal nerves. Consequently, when the central part is irritated, pain is referred via the cervical segment of the spinal column, from which the phrenic is derived to the shoulder and cervical region, while irritation in the lateral part is referred to the region of the distribution of inter-costal nerve segment, the abdominal parietis. Pain in the spine is produced by pleural disease, and not by lung conditions. Acute cases are generally pyrexial. Fever is of a continuous type, and lasts between two to five weeks. Cough is dry and very harassing in early stages. It is unproductive, but when there is bronchitis or other lung condition, there may be some sputum. With appreciable amount of fluid, some breathlessness is always present. Its magnitude depends, not only upon the quantity of fluid present, but upon various other important factors, *e.g.*, the condition of the heart, of the other lung, existence of any displacement of the mediastinum, patient's general condition, etc. Very many deformities of the chest-wall, with lateral curvature of the spine, are present, and it is not surprising that some are common in view of the fact that all movements of the chest-wall are not smooth and regular, but distorted and handicapped by pleural adhesions, and the diaphragm may be completely out of action. It is the body's attempt to produce favourable mechanical conditions and restore the disturbed equilibrium on both sides. Even when the fluid is completely absorbed and the best results achieved, some pleural adhesions are formed. In theory, it is possible that there may be no adhesions at all, or adhesions may be formed wholesale, and the whole pleural cavity completely obliterated, still what actually happens is that there are adhesions in certain regions only.

So, from physical point, the patient, who had pleurisy once, is always at a handicap, the more so during movements requiring exertion.

Of all the physical signs, the most constant and reliable is dullness on percussion, and it is pathognomonic of fluid when it is shifting with change of posture. When dullness is present, the position of the apex beat, whether it is in normal situation, or displaced and towards which side, will be an important consideration in evaluating the differential diagnosis. The auscultatory findings are not constant. These signs depend for their production on two factors,—the extent of the lung collapse, and whether the bronchi remain patent, or they also follow suit in the collapse of the lung, and are unable to conduct air to the lung. Consequently, these signs will vary according as to how far and to what extent each of these factors are operative.

Regarding the other systems, it is worthwhile to take total R. B. C. and W. B. C. counts, and do the examination of a blood-film, for differential count, and for finding out whether any anaemia exists and its type. Sputum examination should always be done, and

peated at intervals, to find out acid-fast bacilli. The presence of her organisms is not conclusive, and their presence does not necessarily imply that they are primarily responsible for pleuritic infection. Sedimentation rate, though not of diagnostic help, serves as a good measuring rod, in the progress of the case.

X-ray examination settles all doubts, if there are any, regarding the presence of the fluid. Fluid as it exudes falls down by its own weight to the bottom of the pleural cavity, and obliterates the costophrenic angle first. The pleural shadow presents upper curved border extending from the medial hilar attachment, upwards towards the axilla. When, however, pneumothorax is also present, this curved border is abolished, and it assumes a straightline fluid level. Mediastinal displacement, if present, will be visible. X-ray may show the condition of the underlying lung. But, when the fluid is of sufficient amount, it may be necessary first to aspirate some of the fluid at least, before the lung condition can be properly visualized.

Treatment.—The general management of acute pleurisy should be on the lines of an acute febrile illness. The patient should have complete physical and mental rest. His movements should be curtailed as much as possible. His diet should not be strictly all liquid, and it must be so arranged that it will not cause digestive upsets. Drastic purgation is not desirable, but the bowels should move 2-3 times daily. Diet is bound to be deficient in many respects, and its vitamin content should be reinforced by Abidol capsules or similar products, which contain the important vitamins A, B, and C.

The control of pyrexia is best secured by complete rest, and its paramount importance cannot be exaggerated. Diaphoretic alkaline mixture is given as a routine, as it helps keeping the skin active and prevents febrile acidosis.

A little fluid from the pleural cavity should always be withdrawn, and examined cytologically and bacteriologically. It is a great help in regulating treatment. In cases of infection due to pyogenic organisms, Sulphanilamide and M. B. 693 should be given a thorough trial. They may prove wonderfully effective. A female patient, 7 months pregnant, came under treatment for pleurisy with effusion. The diagnosis was confirmed by X-ray examination. Cytological examination of the fluid, which was sero-fibrinous, showed that almost all cells were polymorphs. Sputum was repeatedly negative for acid-fast bacilli. Her temperature was of a septicæmic type varying between 97 and 104 with repeated chills, rigors and sweating and absolutely irregular. It did not respond to usual line of treatment, and persisted like that for about two months. It responded most surprisingly and in a dramatic manner to Sulphanilamide. The patient delivered in a normal manner, and the child and the mother are hale and hearty, the mother attending and doing her domestic work without any recurrence now, 1½ years after her illness. Chills and general symptoms of toxæmia can be combated by judicious administration of a mixed respiratory vaccine. In

cases where the nature of infection is doubtful, Iodine—Entodon, Collosol Iodine—and Protein Shock Therapy—Lactunim, Aolan, Omnadin—appear to check the spread of the disease and exudation of fluid. In cases which are suspected to be tubercular, Gold—Solgonal, Sanoecrysin—should be employed from the beginning, but the doses require careful spacing and regulating, so that there are no violent reactions. Calcium is decidedly advantageous as far as can be judged clinically, whether in the laboratory, serum calcium is found raised or not. Calcium is generally employed in the form of Calcium Gluconate 10 p.c. 10 c. c.; but a combination of Calcium and Quinine—Quinine Calcium (Sandoz)—appears better, as in addition to the action of Calcium, it has antipyretic and as advertised, antiseptic action of Quinine.

In acute cases, the patient just naturally clamours for the relief of pain. Aspirin, Veramon, Veganin, Coedine, etc., are employed by mouth, but generally, they are not quite effective, and chief attack against pain should be more locally than centrally. Hot-fomentations, mustard packs, Turpentine stupes, fomentation with hot common-salt and bruised onions, mixed together in a bag,—any of these is more efficacious than sedation orally. Infra-red rays, and the still more modern short-waves are means of applying the heat to deeper parts, and excellent results are claimed for them. Strapping of the chest in the position of full expiration, "binding the hemithorax from spine to sternum" is certainly worthwhile doing. The induction of pneumo-thorax, by introducing a few c. c. of air is surer to succeed.

The use of ultra-violet rays is very beneficial, and it should be started as soon as the acute inflammatory response is over, exudation of further fluid has stopped, and absorption is starting, and the range of temperature is declining. These exposures, it is said, are being given to patients even with high temperatures, in certain sanatoria in India. Employment of ultra violet rays is a potent weapon, and it does cause reactions. In acute cases with high fever, the skin is likely to be highly sensitized, and therefore ultra-violet rays should be used with discrimination. (Attention here may be drawn to reports of dangerous reactions when using Sulphonamide type of drugs and Ultra-violet rays simultaneously.) Exposures should not be limited to the affected regions, but they should be general. The Ultra-violet rays have no power to penetrate deeply enough to reach the pleura, and cannot exert their bactericidal effect locally. It acts on the organism by augmenting its haemo-bactericidal power, influencing calcium metabolism favourably, and stimulating the sympathetic nerve-endings and through them, the endocrine glands.

So far, no mention was made about the aspiration of the fluid, and it appears to the writer, that the question whether fluid should be aspirated in all cases and replaced by air, has not been decisively settled at present, but is still in the melting-pot. There is, however, fairly universal agreement, as to the conditions, when it is not safe to

leave the fluid un aspirated, and under these circumstances, the fluid ought to be aspirated and replaced by air. These indications are:—

- (1) Pressure symptoms—such as much displacement of the mediastinum, cyanosis, respiratory distress, dyspnoea.
- (2) Failure of the fluid to get absorbed within six weeks and persistence of fever.
- (3) Presence of the active tubercular disease in the underlying lung, as demonstrated by X-rays or sputum examinations.

These are the conditions when the fluid should not be allowed to be absorbed naturally. There is another group of experts, who do not advise waiting for these indications to arise, but advise, intervention in all cases of effusion, with aspiration and replacement by air. They maintain that the results of nature's attempt at absorption are far from satisfactory and at best, even though the fluid is absorbed completely, there are always some pleural adhesions left behind. These adhesions are a physical handicap restricting the range of bodily exertions. That is not all. But if in turn, these patients develop tuberculosis of the lung in after years, they are robbed of the chances, afforded by artificial pneumo-thorax in treatment. The pivot of all the argument appears to rest on the assumption, that by aspiration and induction of A. P., no adhesions are formed, while with the natural process, they generally form. BURRELL deprecates such wholesale aspiration, and says that aspiration should be avoided if possible. There is always a risk of pleural shock and sudden death, however low may be the percentage of such occurrences; and moreover, there are no indications before-hand to foretell, which cases are likely to develop such complications, and therefore prepare to forestall them. BURRELL further says: "An important objection to aspiration in tubercular cases is that the majority of such patients make such an excellent recovery if the fluid is left to absorb naturally, probably because the effusion acts as a splint, which rests the lung and usually enables the underlying pulmonary lesion to heal."

Probably, here BURRELL refers to silent foci; and this objection appears to lose its force, when aspiration is followed by induction of A. P.; it will be evident from all this, that there are definite indications, which are universally accepted, when the fluid must be aspirated and A. P. induced, and consequently under these circumstances, no delay at aspiration and A. P. is justifiable. But when these indications are not present, and there is a fair amount of fluid, it is not generally agreed upon whether aspiration with A. P., or leaving the fluid alone, would benefit the patients most. Here also it must be recalled, that it is not possible without actual definite signs, to fore-cast accurately which patients would develop tuberculosis of the lung in years to come. It is indisputable that a large proportion does develop. So the argument that all fluids should be aspirated and A. P. induced, appears very logical and reasonable. But

on the other hand, it may be that absorption and removal of the fluid naturally by the pleuritic membrane confer certain immunity on the organism. To those, who are biologically minded, this argument will have irresistible appeal. But the acid test of the truth of any argument in medicine is the clinical experience, and its proper assessment and correct interpretation. As said before, this aspect of the subject is not solved, and it should be left to the expert and the specialist to solve it, and give a definite lead, generally accepted amongst them, to the general practitioner. That is likely to happen in the near future. In the meantime, it is better for the general practitioner to be more orthodox and less ultra-modern in therapeutic fields.

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Pneumothorax

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Pneumothorax.—Is common between 20 to 40 years of age and means air or gas in the pleural cavity. In a large majority, there is also present serous or purulent fluid, and the condition is then termed hydro or pyo-pneumothorax. Inert gas like nitrogen, when introduced into the pleural cavity, may induce serous exudate in about fifty per cent of cases. In the absence of sepsis, pleural irritation probably induces this fluid to collect.

Ætiology.—The causes may be :—

1. *Lung* :—About eighty percent occur from sub-pleural tuberculous cavity of more or less recent origin, or from other tuberculous lesions approaching the pleura. Old tuberculous lesions by producing fibrosis do not, so commonly, appear to cause this condition. Generally, about five per cent of all cases of pulmonary tuberculosis develop pneumothorax in some part of its course. Rupture of an emphysematous bullæ,¹ pulmonary abscess, gangrene, bronchiectasis, infarct new growths and an empyema bursting into the lung might produce it. Much is being discussed about "benign spontaneous pneumothorax,"² in apparently healthy, non-tuberculous subjects. Even a repeated type of this condition has been described. Air-cysts in lung by bursting out may rarely cause pneumothorax.¹

2. *From neighbouring Organs*, such as carcinoma of the œsophagus, stomach or from corrosives or burn etc. abscess of liver, or sub-diaphragmatic abscesses bursting into the pleural cavity or lung might cause it.

3. *Trauma or Injury* :—Wounds of the chestwall, usually produce hæmo-pneumothorax. In paracentesis thoracis, artificial pneumothorax, also hæmo-pneumothorax may be induced.

4. *Gas* :—In the pleural fluid as a result of bacterial activity might rarely produce it.

Pathogenesis.—A fit of cough or hard physical exertion usually causes rupture which may be felt by the patient and air from the lung rushes into the patent interpleural space, having normally a negative pressure, causing collapse of the lung. The more sudden the onset and greater the positive pressure, the more acute are the signs, symptoms and displacement of the heart and other mediastinal contents. The opening when remaining patent allows air to come in and go out, the lung fails to expand leading ultimately to the falling back and contraction of that side of the chestwall. The opening, when closed, allows the lung to expand and things may be normal in a short time. But the most interesting is the valvular tear, only allowing air in,

under strain of cough or deep breath, not allowing air to go out, thus increasing the interplural pressure more and more. This form with urgent signs and symptoms is called suffocative type of the disease. Pneumothorax seldom remains without fluid collection, thus when purulent, is called pyo and when clear, hydro-pneumothorax. Partial pneumothorax, from pleural adhesion, is not very uncommon, but the so-called localised pneumothorax of old writers, as investigated by skiagram and modern methods, appears to be not so common as was suggested then.

Signs and Symptoms.—These are very variable. In a big series of 500 cases collected by PEPPER³ (1911), the onset was sudden in 77 per cent and insidious in 23 per cent, causing acute and insidious manifestation respectively.

Acute Type:—There is, as a rule, sudden agonising, stabbing or tearing pain caused by stretching of the parietal pleura. Dyspnoea may be suffocating, notably when the unaffected lung is also *tuberculous*. Shock is more or less present. The patient is "pale, expression anxious, pulse rapid and weak, the temperature falls, the extremities are cold and the body is bathed in cold sweat."

Insidious cases may pass unnoticed, specially if the subject is affected by advanced pulmonary tuberculosis, already manifesting pain, dyspnoea and tachycardia. Some of these cases are diagnosed in routine skiagraphy or physical examination, or on the autopsy table.

Physical Examination.—*Inspection:*—Though the decubitus is a propped up one, yet, it may not be characteristic. Diminished mobility, fullness of the intercostal spaces and displacement of the apex away from the affected side are characteristic. If the lung does not expand properly, that side of the chest becomes retracted.

Palpation:—Tactile fremitus is either diminished or absent. The findings of inspection are verified, the liver may be pushed slightly downwards.

Percussion:—The note may be either drum-like or tympanitic. Presence of fluid starts with dullness at its upper level.

Auscultatory:—Findings are variable: the breath sound absent or distant in most cases, in some is metallic or bronchial. Vocal fremitus as a rule is absent or faint.

Metallic Tinkle:—This when present is a valuable sign. It is a curious musical echo accompanying breath-sound, spoken voice, or a cough or scratching of the chest wall by a nail.

Succussion Splash:—Is one of the oldest signs and described first by HIPPOCRATES. The sound is produced by splashing of fluid in a resonating cavity containing air.

It is elicited by shaking the patient, while the chest is being simultaneously auscultated either directly placing the ear over the chest or through a stethoscope.

Coin Test:—Next to succussion splash, this is the most important test. It is best heard, when present, at the back of the chest, while a rupee is sounded by another coin transversely placed so that the flat coin lying on the upper chest is made to resound maximally. The doctor hears the musical metallic tinkle with his stethoscope while the coin is being so sounded.

Skiagram:—The skiagram is essential to ascertain the exact state of affairs. Unlike the curved level in empyema or effusion in pneumothorax, the upper level of fluid stands in a straight horizontal line.

Exploration:—Under two percent Novocaine local anaesthesia, if a stout bore sterile needle is introduced, air comes out under pressure. (For the details, see treatment.) Also, exploration of the fluid may add to the diagnosis. It is interesting to note that in seven years, there were 473 autopsies on subjects dead of tuberculosis of lungs in PHIPPS Institute. Among these, there were 41 instances of pneumothorax making up a percentage of 8.6%. In these 41 cases following physical signs were positive:—Coin test in 90.6 per cent; expansion absent or restricted in 89 per cent; hyper-resonant in 82%; bulging of the affected side in 77 per cent; breath sound distant in 52.6, absent in 18, amphoric in 15, cavernous in 7.5 and broncho-vesicular in 5—all expressed in percentage; metallic tinkle in 38.8 per cent and succussion splash in 31.5 per cent.

Partial Pneumothorax will give signs and symptoms according to the extent, type and character of the lesion. All or a few of the above characteristic signs and symptoms may be present in such cases.

Diagnosis.—This depends on all findings given above and also on the signs and symptoms complained of by the patient, skiagram, exploration, etc.

Differential Diagnosis.—*Emphysema*, when associated with pneumothorax, may present difficulty, as they sometimes, closely resemble each other. HAMMAN (1916) showed that in the sound side, the lower border of the lung, as determined out by percussion varies according to inspiration and expiration, whereas on the affected collapsed side, there is no respiratory variation. The extension of the pulmonary resonance to the full capacity of the pleural space with the absence of variation at the lower margin during respiration, is characteristic of pneumothorax without effusion. The other signs and symptoms of normal lung only modified due to emphysema, skiagram, etc., are helpful.

Tuberculous Cavity:—Big superficial cavities may present features difficult to distinguish from pneumothorax. But, the chest on the side affected by cavitation is likely to be retracted than bulged, the heart is either in normal position or is drawn towards by fibrosis in chronic tuberculosis and not pushed away as in pneumothorax. Usually, signs of consolidation or some lung sound may be heard around tuberculous cavities, which as a rule are lacking in pneumothorax. None of the

classical signs and symptoms of pneumothorax are encountered. A skiagram is of much service.

Pleural Effusion may cause confusion when the collapsed lung at the top gives amphoric breath sound and metallic quality of sound of voice, but the resonance at the top, with fluid below and absence of the characteristic signs and symptoms of pneumothorax will help. A skiagram may help to clarify the mystery.

Subphrenic Abscess may rarely give metallic tinkle and even succussion splash. But, the history of gastro-intestinal disturbances and absence of cough etc., with right-sided pain and absence of characteristic signs and symptoms in lungs of pneumothorax, and a skiagram may help.

Hernia of Diaphragm:—This rare condition may afford trouble, but here again a skiagram, history of abdominal complaints and careful exclusion of lung lesions will help. In both of these abdominal conditions, no displacement of mediastinum is likely.

Prognosis depends on the underlying cause of the condition. In mild tuberculous conditions, the collapse of the lung might prove beneficial by giving rest, etc., to the foci, whereas it may be the end in advanced cases of pulmonary tuberculosis, notably, when associated with pyo-pneumothorax. In emphysema, the lung might get back part of its resistance. In spontaneous benign form, the patient may live for years, without any disability or evidence of disease. Cases have been reported of fatal issue during the earlier part of the condition. Pyo-pneumothorax of tuberculous origin may have 70 per cent ultimate mortality, and even 20 per cent may die during the first week.

Treatment.—Rest and Care:—Whatever may be the underlying cause, the initial treatment is the same in all. If there is less severity of symptoms, all that is required is to put the patient strictly in bed. The lung re-expands in a few days' time. However well the patient may feel, it is extremely unwise for him to be up and about; this means great delay in the re-expansion of the lungs, and the risks of complication are correspondingly increased. If there is a valvular tear in the visceral layer of the pleura, then with each bout of cough or with deep breath, more air is drawn in resulting in an increased and pronounced dyspnoea. Hence the importance of a constant attendant for the first few days of the trouble.

For Simple Cases:—The patient should be confined to bed till the lung has re-expanded. But, even after that, he should take a few weeks' rest before reverting himself to work, for ruptured bulla of an emphysematous lung in a young person the organ usually re-expands in one to two weeks' time, and the risks of subsequent tubercular infection are not much.

Pain:—Strapping the affected side may do some good. Morphine, Atropine in $\frac{1}{4}$ and 1/200 gr. doses respectively, are often very convenient for relief of pain in an adult. Eukodal tablets or other

hypnotics of the Barbiturate group, with Veramon or Saridan may be tried, but Morphine and Atropine are probably the best. Veganin, Optalidon or Codopyrin may also be tried for the pain, but none so useful as Morphine and Atropine.

Dyspnoea:—For immediate steps, one should anaesthetise the pleura by a three to five c.c.m. of a two per cent solution of Novocaine and the needle of a pneumothorax apparatus put in and the extra amount of air giving rise to the positive pressure should be carefully withdrawn care being taken that the water in the manometer is not forced out by too much of positive pressure. If, after withdrawal of some air, there are indications of increased pressure, a needle kept permanently may be the only solution. Inhalation of oxygen liberated at a brisk rate through a nasal catheter may be of relief. But, in the majority of cases, there will be no pneumothorax apparatus available; under such circumstances, an ordinary stout bore needle may be inserted after local anaesthesia by Novocaine near about the fifth interspace in the midaxillary region of the affected side. So long as the extra air passes out through the needle with a sound, one can keep the needle in. But, as in the majority of cases, the rent in the pleura is such that constant but further leakage of air takes place inside the interpleural space, thus necessitating the constant keeping of the needle in the pleural cavity covered with sterile gauze and fixed up by a strap of adhesive plaster. Sometimes, this needle may have to be connected with a sterile rubber tubing, the end of which lies under sterile water kept in a glass or cup. This ensures only the outlet of the air under positive pressure in the pleural cavity, and does not allow any air being sucked in inside the pleurae. These measures are, as a rule, required for a short time, say a few days, then gradually healing starts, leading to the closure of the tear and re-expansion of the lung.

Failure to Re-expand:—When the lung fails to re-expand even after proper rest for a reasonable period, one should remove about four to seven hundred c.c.m. of air from the pleural cavity, but the negative pressure should not be allowed to reach below 15 c.m. of water, as measured by the manometer of the A. P. apparatus. If further reduced, the subjective symptoms of faintness or even grave collapse may be evident; not only this, a slight positive pressure in the interpleural space also helps in the easy closure of the tear.

Effusions in Pneumothorax:—May be clear or turbid or frankly purulent. When the fluid is initially clear and tends to turn turbid subsequently, one should suspect non-closure of the tear in the visceral pleura, and the outlook is correspondingly grave.

But not uncommonly, clear effusion results in A. P. cases. This may mean slight damage to the visceral pleura either at the site of an adhesion, or accidental injury during A. P. This tends to heal spontaneously.

But in cases, where the pus is purulent and the tear on the visceral pleura does not close up, the patient seldom lives for more than

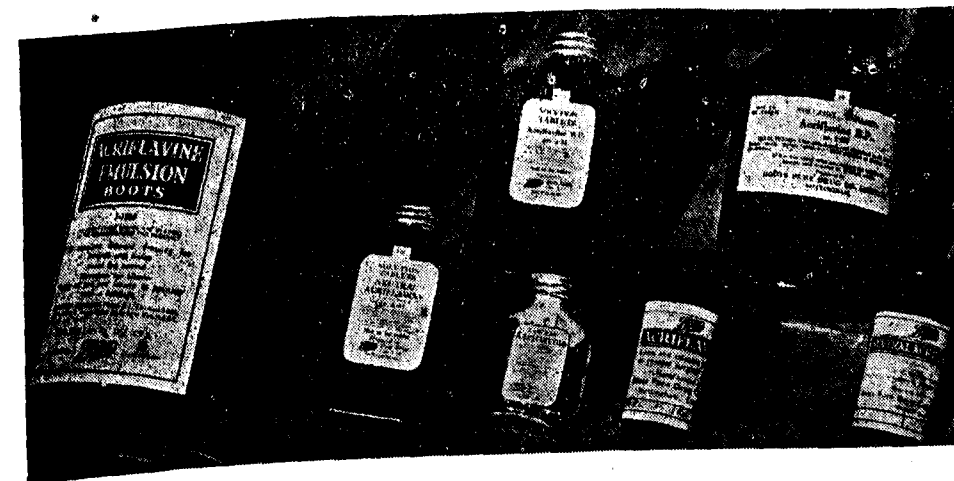
one year or so. In these persons, the pus should be aspirated, the cavity irrigated by about ten to twenty ounces of 1 in 4000 solution of Methylene Blue. This also helps in the diagnosis. If there is blue coloration of the sputum, the indications are that there is a patent cavity in the visceral layer of the pleura. When this perforating hole is very big, the breath sound is as a rule amphoric and has a metallic character and the bell-like sounds on coin percussion are well heard.

Pus in closed visceral Pleura.—In cases where the tear in the visceral pleura has healed up, the pus should be repeatedly aspirated and replaced with sufficient air to leave a pressure of from 10 to 15c.m. of water. The patient should be screened regularly at weekly intervals. Lavage of the pleural cavity by suitable antiseptics is also of use. If this treatment does not do much good, the help of a surgeon may be of great use. But, opening up of a tuberculous cavity with pus is usually disastrous and leaves a permanent opening.

Subsequent Treatment.—The skiagram, sputum examination and all other investigations should be made in order to come to a proper diagnosis, because the subsequent line of treatment will depend entirely upon the nature, type, degree, etc., of the original disease of which pneumothorax is but a symptom. Generally, the majority may require an anti-tuberculous regime for which the treatment of pulmonary tuberculosis should be consulted. When there is failure of the lung to expand properly, forced expiration by blowing water in WOLFE's bottles may do good.

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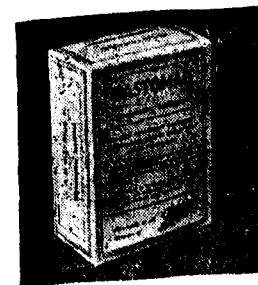


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The Treatment of some Common Respiratory Disorders of Childhood

BY

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THIS article does not pretend to be in any sense a learned treatise, it is, rather, written from a purely clinical standpoint in the hope that some of the practical points mentioned may be of value to those who are as yet inexperienced in this branch of medicine.

Let us first consider enlarged tonsils and adenoids. The fact that a child suffers from either or both of these conditions, is not in itself an indication for operative interference. The line of treatment to be adopted should be decided upon after very careful consideration of the symptoms to which the enlarged tonsils or adenoids are giving rise, and it must always be remembered that the tissues concerned undergo an involution after puberty. In his most valuable book "Common Disorders of Childhood", DR. G.F. STILL sums up the indications for operation as:—

- (1) The slightest degree of deafness, when enlarged tonsils or adenoids are present.
- (2) Recurring earache.
- (3) General ill health.
- (4) Frequent and harassing recurrence of acute tonsillitis.
- (5) Deformity of the chest resulting from throat obstruction.

Before we consider the conservative treatment of those conditions, let me stress the fact that if operative measures are adopted, it should be remembered that the operation, though a small one, can be dangerous if carried out by an inexperienced or "slap-dash" surgeon or with an unskilled anaesthetist, and that if the operation is only partially successful, the patient will be likely to have post-operative trouble, immediate or remote.

Conservative Treatment—Adenoids and Tonsils.—Attention to general health, fresh air, nourishing food.

Adenoids:—Children of eight years and upwards should sniff a lotion up the nostrils, night and morning; the following formula (of the King's College Hospital Pharmacy) is recommended: Sod. Bicarb, Borax, Sod. Chlorid aa gr. xv, Glycerine dr. i aq. ad oz. i a tablespoon to be used with two tablespoonfuls of warm water. For younger or for timid children, a spray can be used, preferably one in which an antiseptic is mixed with an oily base.

Tonsils:—Where the tonsils are not of hard fibrous appearance, attention to general health and hygiene will probably result in a decrease in size without any local application; if, however, there is a tendency to recurring tonsillitis, the persevering application of an

antiseptic or astringent, twice a day for *some months*, often has very beneficial effects.

Whooping Cough.—In this illness, it should be remembered that abundance of fresh air and sunshine is of great benefit to the patient. The shaking effect of the paroxysms may be modified by the application of a light binder to the abdomen. Food should be light and digestible and an excess of starchy food avoided. When dealing with uneducated parents, or with those who find it hard not to yield to every whim of the child, the question of dieting always presents difficulty but at least the mother can be instructed to give the child small quantities of food, immediately after the severe paroxysms of coughing. In severe cases, it may be necessary to insist on a purely milk diet for some days. Pertussis Vaccine is being used by some physicians as an adjunct to treatment, but I have not yet had sufficient experience in its use to draw my own conclusions as to its merits. If used, it should be employed in the early stages of the illness, and unfortunately, the majority of cases are brought to many of us only when the infection is well established. I do not propose to enumerate the drugs found to be of some use in whooping cough, as these can be found listed in any reliable text book, but shall now pass on to the consideration of some practical points in the treatment of what is so often a complication of whooping cough and measles, namely bronchitis.

Bronchitis, unfortunately, is very common in infancy and in the treatment of this disorder, we must always remember that an infant does not possess the power of expectoration in the same degree as an adult. Inexperienced practitioners, yielding to the insistent urge of the parents, are apt to pour expectorants freely down the infant's throat and many precious lives are lost by the drowning of the child in its own secretion. In the early stages, when secretion is still scanty (determined by the presence of rhonchi and absence of a marked number of rales) minute doses of expectorants may certainly be given *e.g.* (for a child under a year old.) Vin. Ipec m. iip. Sod. Bicarb. gr. iip. Spirit Aeth. Nitros. m. iip. Syrup m. xv Aq. Anethi ad. 3 i. but the younger the infant the more spaced should be the doses. A careful watch must be kept for alteration in the adventitious sounds and when rales are found to predominate, Ammon. Carbonate or Tr. Scillæ or both should be given—in the case of infants, in minute doses (gr. $\frac{1}{2}$ and m. ii respectively)—to enable the patient to get rid of the secretion. The gentle rubbing of the chest with Lin. Camph. is both comforting and efficacious during the earlier stages of the illness, and the proprietary preparation "Vick's Vapo-Rub" I have found to be excellent. I am convinced that unless poultices and Kaolin paste preparations are applied by experienced hands, they are far better left unapplied, the risk of scalds and burns being a very real one. In the early stages of bronchitis, a steam kettle preferably with Tr. Benzoini Co. 3 i added to the water therein is of the greatest service. It is not necessary for the child to be wholly incarcerated in a tent of thick cloth, in fact to be so is prejudicial to his welfare; if the room

is small, the kettle may be left boiling on an angithi and the atmosphere will be adequately moistened by the steam passing from it; if, however, the cough is very frequent and ineffectual, a partial tent is of great value.

Finally, let it be remembered that the child with bronchitis requires *air*. Do not allow the patient to be kept in an ill-ventilated room packed with sympathising visitors and heated by one or two angithis filled with fuming charcoal. Moreover, remember that the chest is already working overtime, do not add to its work by weighing it down with a pneumonia jacket, one or two padded waistcoats and a sweater! A soft woolly vest and a cosy outer garment are all that is required.

Broncho-pneumonia.—Each winter those of us who work in North India are called upon to treat a number of children with this dangerous complaint. Text books provide ample details of standard methods of treatment and here I only wish to stress a few points of practical importance which may sometimes be overlooked. (1) Let us remember that leeches can be of great value when the right heart is becoming markedly dilated, *but* if you apply them, do not drain the child of a great quantity of blood. In infants, two leeches are adequate and in no case should more than four be employed. The site of choice for their application is over the sternum. (2) Remember that a tiny child cannot change his posture at will. It is of the utmost importance in this illness that infants should be shifted frequently, from one side to another, so that each lung in turn may move freely. (3) In spite of the great importance of glucose, which should be freely used in these cases, I am still of opinion that brandy in small doses is of great value in broncho-pneumonia. The dose for a child under a year should not exceed fifteen minims and often five will be adequate. It should be administered every four hours for a short time, if exhaustion is threatened, and the pulse becomes poorer in quality. Children aged one to five, may have rather larger doses but never more than 40 minims a dose. (4) In this country, the practitioner needs to stress the fact that a child is far more comfortable, propped up in bed, than in his mother's lap (a small rezai rolled up and padded at the front with soft pillows makes an excellent bed rest). It should be pointed out that to haul the child about may mean the loss of his life. One should also stress the necessity for fresh cold water and see to it that the thirsty little patient receives it freely.

Hæmoptysis-Differential Diagnosis, Prognosis and Treatment

BY

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HÆMOPTYSIS, literally means blood spitting, but clinically it is restricted to bleeding from the lungs, bronchi, trachea and larynx. It has to be differentiated from bleeding from the mouth, nose pharynx, œsophagus and stomach.

A careful rhino-pharyngeal examination will exclude such conditions as epistaxis, bleeding gums, pyorrhœa, pharyngitis, septic sinuses, tumours such as retropharyngeal fibroma and rarely varicosities at the base of the tongue and lupus of the palate. "In the presence of frank hæmorrhage, the burden of proof rests on the doctor to show that it is not from the lungs. To take it lightly is serious."

Hæmatemesis is readily distinguished from hæmoptysis but sometimes when the blood coming from the lungs has been swallowed first and then vomited, or rarely bright red blood wells up from œsophageal varices, or is even aspirated into trachea and then coughed up, distinction between the two becomes difficult. A summary of the points of distinction, between hæmoptysis and hæmatemesis (according to FRENCH) is given below :—

Hæmoptysis

1. The patient coughs the blood up.
2. Part of the blood is often frothy.
3. The blood may occur by itself, but it is often mixed with sputa, recognizable microscopically.
4. The blood is alkaline in reaction.

5. Tubercle bacilli or elastic fibres may be detected.

6. There may be previous history of acute rheumatism or of cough and night sweats, indicative of heart or lung disease, confirmed by abnormal cardiac or pulmonary physical signs.

Hæmatemesis

1. The blood is vomited.
2. The blood is not frothy.
3. The blood may occur by itself, but it is often mixed with vomit, recognizable by the presence of food particles.
4. The blood may be alkaline if it is abundant, but it may be acid from admixture with gastric juice.
5. Tubercle bacilli will be absent.
6. There may be a definite history with or without physical signs, pointing to a gastric lesion or to cirrhosis of the liver.

Hæmoptysis

7. Before the blood is coughed up, there is often a sense of tickling or gurgling in the throat, always suggestive of true hæmoptysis.

8. The motions are not altered afterwards unless the blood has been abundant, and much of it has been swallowed when they may be tarry as in hæmatemesis.

9. Blood-stained sputa may be expectorated for several days after a severe attack.

10. A history of cough.

Hæmatemesis

7. Before the blood is brought up, there may be a feeling of sickness, nausea, oppression in the epigastrium, faintness and giddiness.

8. The motions are often black and tarry afterwards.

9. There are usually no sputa.

10. A history of abdominal pains after food.

To the above, the following point described by GOLDMAN² may be added.

11. Bleeding occurs first and then pallor and faintness ensue.

11. The patient usually turns pale and may faint and then has hæmatemesis.

Malingering by the production of blood spitting by gum-sucking, is diagnosed upon circumstantial evidence.

Very rarely, red colour of the sputum may be due to the infection of the respiratory passages by relatively unimportant pigment-producing organism of the *Bacillus prodigiosus* type, which is to be distinguished by careful bacteriological examination of the sputum and by negative microscopic and chemical tests for blood.

Classification (according to GOLDMAN)² of conditions that may cause true hæmoptysis.

A.—From Larynx.

1. Injuries.
2. Varicositis.
3. Angiomas.
4. Any acute laryngitis.
5. Ulcerations. (a) luetic, (b) tuberculous or (c) malignapt.

B.—Conditions causing bleeding from Trachea.

1. Varicositis.
2. Foreign bodies.
3. Acute congestion, the result of :—(a) Pressure of aneurysm, enlarged thyroid or any other tumour. (b) Irritant gases such as chlorine or mustard. (c) Acute infections such as influenza.

4. *Ulcerations*:—(a) Luetic. (b) Tuberculous or (c) Malignant. All the above-mentioned causes for bleeding, may be either directly visualized by the laryngologist and bronchoscopist, or suggested by general bodily check-up.

C.—*In diseases of Lungs and Bronchi.*

1. Pulmonary Tuberculosis.
2. Bronchiectasis.
3. Broncholithiasis.
4. Pulmonary abscess.
5. Pulmonary gangrene.
- 5.-(a) Pulmonary-infarction.
6. New growths.
7. Injuries of the lungs.
8. Pneumonia, and broncho-pneumonia.
9. Pneumoconiosis.
10. Fungus infections.
11. Foreign body.
12. Fusio-spirochætosus.
13. Parasites *e. g.* Distoma pulmonis—(WESTERMANNI infestation), hydatid cysts.
14. Bursting of abscesses into lungs.

D.—*In diseases of Heart and Vessels.*

1. Mitral stenosis.
2. Thrombosis, and emboli from cardiac disease.
3. Emboli from phlebitis.
4. Aortic aneurysm rupturing into the lung, bronchi or trachea.
5. Hypertension.

E.—*Diseases of the Blood.*

- | | |
|-----------------------|---|
| 1. Purpura. | } Hæmoptysis, in these conditions, is merely incidental. Their diagnosis is suggested by more prominent lesions elsewhere and by blood examination. |
| 2. Scurvy. | |
| 3. Hæmophilia | |
| 4. Leukæmia. | |
| 5. Pernicious anæmia. | |

F.—*Vicarious Menstruation.*

G.—*Hæmoptysis in the Healthy.*

The last is a definite but important group of cases, usually in young healthy individuals who bleed once or even recurrently, but in whom, all the instrumental aids to diagnosis fail to reveal the real nature of the malady. Professional responsibility demands careful and prolonged watching of such cases.

Important Points of Differential Diagnosis.—1. *Pulmonary Tuberculosis*:—"Pulmonary tuberculosis is so far the most common cause that the expectoration of any considerable amount of blood should be considered to mean tuberculosis unless or until it is proved otherwise".—BARNARD FANTUS.³

"Once it has been decided that true hæmoptysis has occurred, the next step is to examine the sputum and the chest carefully for signs of tubercle, and not to diagnose any other condition until both tubercle and mitral stenosis have been excluded"—HERBERT FRENCH¹

"It must never be lost sight of that hæmoptysis may be a symptom of every disease of the upper and lower respiratory tracts, tuberculous as well as others. Mere streaks in the sputum may be due to many causes other than tuberculosis of the lungs, and a diagnosis of phthisis should not be made because of their presence alone".—FISHBERG.⁴

In the diagnosis of pulmonary tuberculosis, the previous history, personal and family, the physical examination, study of the sputum, and roentgenographic appearances of the chest, are all of value.

In doubtful cases, a tuberculin test may be of value, especially if negative. Freshly prepared dilution of tuberculin (O.T.) is injected in quantities of .01 mg. intracutaneously, or 1 mg. subcutaneously and the test repeated with larger doses at intervals of 4 days or longer, till 1 mg. (for intracutaneous) and 6 mg. (for subcutaneous) doses are reached, before declaring the person to be tuberculin-negative.

In cases of pulmonary tuberculosis, blood may be a mere streak in the sputum, or so copious as to be immediately fatal, and may appear at any stage of evolution of the disease—the initial, the active and the healed.

2. *Bronchiectasis*:—"When pulse and temperature of the patient are normal, and his general condition good, the chances are that there is a bronchiectatic cavity, especially in persons over 45 years of age. When physical examination shows that the lesion is localised in a lower lobe, while the apices are free from pathological changes, the disease is almost invariably non-tuberculous bronchiectasis, pulmonary abscess, gangrene etc."—FISHBERG.⁴

Bleeding occurs in 50% of cases of bronchiectasis. The blood is usually well mixed with sputum, but in some cases, there may be severe bleeding, practically never fatal. Bronchiectasis seldom occurs apart from fibrosis, the physical signs of which are diminished bulk, movement, resonance, tactile, and vocal fremitus; breath sounds accompanied by numerous crackling rales, especially after coughing; the heart is displaced materially towards the affected side.

Lipiodol radiography of the chest done after the bleeding has ceased, will clear the diagnosis in obscure cases.

3. *Broncholithiasis*:—"It is not a very common condition, but is diagnosed readily by the presence of small stones in the sputum.

The bleeding is often mild but may become severe, and usually occurs as the stone is coughed up. Tentative diagnosis may be made on the basis of numerous calcifications seen in the X-ray plate. Lipiodol skiagram and bronchoscopy help in the diagnosis.

4. *Abscess of the Lung*:—It often shows bloody sputum well mixed with pus. Frank bleeding may be present. Fever, cough, foul purulent sputum, following upon a recent pneumonia, are very suggestive. Physical signs are not made out readily, unless the abscess cavity is large and close to the periphery.

Microscopically, sputum shows lung tissue, but no tubercle bacilli. X-ray examination of the lungs with and without Lipiodol is helpful in diagnosis.

5. *Pulmonary Gangrene*:—Bleeding varies from a small amount of blood to very large hæmorrhage, which may frequently be fatal. Extreme stench of breath and sputum, combined with marked toxæmia and emaciation, are the striking features.

6. *New growth of the Lungs*:—Pain in the chest, dyspnoea and hæmoptysis (as streaks, rarely copious) in a person past middle age, combined with signs of consolidation with distant breath sounds is suggestive. X-ray photograph of the chest often clinches the diagnosis. A hæmorrhagic pleural effusion containing malignant cells; the presence of tumour tissue in expectorated sputum; the bronchoscopic evidence of tumour and the atelectasis as evidenced by Lipiodol injection afford confirmatory evidence.

7. *Injuries of the Lung*:—"Hæmoptysis, immediately following the injury, is not absolutely essential to establish the relationship between injury and disease, for laceration of the lung may occur without causing hæmorrhage.

When hæmoptysis occurs, as it does in many cases, the quantity of blood expectorated is no criterion of the size of the torn vessel or the extent of the area of lung tissue contused". (FISHBERG.)⁴

Blows to the chest wall and compression injuries accompanied with or without fracture of the rib, (the latter may puncture the lung) are responsible for varying amount of hæmoptysis. More important aspect of these lung injuries is with regard to the activation of an old tuberculous focus.

Enormous intrapulmonary tension, created in violent coughing and in severe strain caused by lifting heavy loads, may be the cause of true hæmoptysis, if tuberculosis and heart disease can be excluded.

Severe coughing may abrade the surface of frænum linguæ as the result of the tongue striking against the edge of teeth, leading to the expectoration of blood-stained salivary sputum—spurious hæmoptysis.

8. *Pneumonia and Broncho-Pneumonia*:—The sputum in lobar pneumonia is blood-streaked and later becomes rusty. It may, at times, be copious, when the question of classifying it as phthisis

or pneumonia super-imposed upon phthisis, will arise. The characteristic attributes of pneumonia, namely viscid sticky sputum, high ratio of respiration to pulse rate, absence of chlorides from the urine, predominance of *Diplococcus pneumoniae* and the absence of tubercle bacillus in the sputum, clarify the problem. An X-ray photograph of the chest is a reliable aid in such cases.

The subsequent course of the illness will, however, positively unfold its real character. Hæmoptysis in broncho-pneumonia is not striking, because broncho-pneumonia is a disease of children of an age, at which they have not learnt spitting.

Septic broncho-pneumonia, resulting from inhalation of septic particles from mouth, as after operations under anæsthesia, often shows bloody sputum. In broncho-pneumonia of the influenzal type, frank blood is often present. The markedly prominent cyanosis, extreme prostration, and the epidemic nature of the disease, are the special distinguishing points.

9. *Pneumoconiosis* rarely, is a cause for hæmoptysis. It is often associated with tuberculosis and syphilitic infections which should be investigated.

10. *Fungus Infection or Sporotrichosis*:—Patients, whose occupation leads to contact with vegetable products such as hay, straw, grains, or cotton, are liable to infection with fungi that may be present there, and cause a condition of granulomatous inflammation and suppuration in the lungs. *Actino-mycetes* and *Streptothrices* are the well known fungi responsible for such conditions. These can only be diagnosed by special cultural examination.

11. *Foreign body in the Lung*:—Foreign bodies block a bronchus, leading to atelectasis, inflammation and even suppuration. History of the case, accompanied by Lipiodol radiography and bronchoscopy enable accurate diagnosis.

12. *Fuso-spirochaetosis*:—Infection of lungs and bronchi with fusiform bacilli and spirochaetes cause this condition, which may show blood-streaked sputum or mild hæmoptysis. The presence of these organisms in large numbers clinches the diagnosis.

13. *Infarction of the Lung*:—A large embolus causes sudden death without hæmoptysis, a smaller one gives rise to sudden acute pain in some part of the chest, a local patch of pleurisy, which has often an impaired note on percussion, and shows bronchial breathing, accompanied with crepitation, and copious hæmoptysis. The presence of endocarditis, or systemic thrombosis along with the above symptoms, causes no difficulty in diagnosis. Thrombosis of deep seated veins, however, may be difficult to spot.

14. *Distoma Pulmonale Westermanni* infestation is to be considered in those who have been to endemic areas in China, Japan and Formosa. Examination of the sputum will show either the parasites or the ova.

15. *Hydatid Cysts* may occur in the lungs, usually secondary to those of liver. They may be quiet or cause hæmoptysis by causing turgescence of the mucous membrane of the bronchus pressed upon. Eosinophilia, positive complement-deviation test, and the characteristic non-pulsatile opaque globular mass by the X-ray examination, are the diagnostic features of the condition.

16. *Bursting of Abscesses into the Lung*:—Hepatic abscess giving rise to anchovy sauce coloured sputum, brought up suddenly by a patient in whom the liver dullness extended upwards and who had hectic pyæmic temperature with polymorphonuclear leucocytosis. The past history will indicate an attack of previous dysentery. Therapeutic response to Emetine will help in clinching the diagnosis.

A hidden empyema sac sometimes bursts into the lungs with the appearance of pus expectorated in large amounts. Blood may or may not be mixed with it. Skiagram of the chest, and the previous history of pneumonia, which was never fully recovered from, point to correct diagnosis.

Diseases of Heart and Vessels. 1. *Mitral Stenosis*:—It is second only to pulmonary tuberculosis as the most common cause of hæmoptysis. The hæmorrhage is usually slight, coming by seepage of red blood cells from the over-distended pulmonary capillaries, or by their actual rupture. At times, very severe paroxysmal pulmonary hæmorrhage occurs, leading sometimes to a fatal issue.

The history of previous acute rheumatic fever or chorea, the physical signs in the heart, notably not much displaced apical impulse, snapping first sound preceded by a rough rumbling pre-systolic mitral murmur, accentuated or re-duplicated pulmonary second sound, and an X-ray photograph showing enlargement of the heart upward and to the left, together with a prominent left appendix nodule point to mitral stenosis. Tuberculosis as a complication of mitral stenosis is rare.

In congestive heart failure, resulting from mitral and aortic lesions, there is slight rusty sputum, the result of diapedesis of red blood cells.

Congenital Heart Disease:—The acquired form is so liable to lead to phthisis that any hæmoptysis associated with it, would arouse suspicion of the latter.

Fungating endocarditis may cause hæmoptysis, but is the result rather of septic state or of infarction than of vascular lesion.

Embolism of branches of pulmonary artery is much less seen than thrombosis of the same. This is due to detached pieces of ante-mortem clot from the right auricular appendix, or other part of right side of the heart. It causes sudden acute pain in chest, orthopnoea, dyspnoea, cyanosis and hæmoptysis. Thrombosis of the above vessel is due to the combined effect of slowing of the blood stream and of atheromatous changes in its tunica intima consequent on the

strain put on the interior of pulmonary arterioles by the block to the free circulation of blood through the narrowed mitral valve in front of them.

This causes hæmoptysis without the acute symptoms and distress seen with embolism.

Aortic Aneurysm may cause slight hæmoptysis by seepage of blood from it into the bronchial tubes, which it may erode, or more usually to the turgescence of the bronchial mucous membrane due to pressure of the sac in the wall of the bronchus. Such seepage is frequently mixed unless attention has been drawn to it by other symptoms such as pain in the chest or in the back and disturbances of speech.

Past history of syphilis in a middle aged person, combined with the characteristic pulsating appearance on the fluoroscopic screen will enable an accurate diagnosis.

Frequently, an aortic aneurysm ruptures into the bronchial tubes causing immediate death. It is interesting to note that the aneurysm may have been so silent that sudden fatal hæmorrhage may be the only sign of its previous existence. A deep seated aneurysm, pressing on a bronchus, may cause diminished air entry into the corresponding portion of the lung, with impaired note and a few persistent rales—a picture closely simulating tuberculosis, from which it is to be distinguished by the absence of tubercle bacilli from the sputum, and the characteristic roentgen-ray appearance.

Hypertension:—In such cases, slight hæmoptysis occurs occasionally the result of congestion or rarely infarction of the lung.

Vicarious Menstruation.—It means hæmoptysis of varying degree supplanting the periodic uterine outflow.

Careful clinical observation has, however, shown that in these cases we deal with ordinary tuberculous hæmoptysis in phthisical women, in whom amenorrhœa is one of the cardinal symptoms. In some cases, there is tuberculous lesion which has not been diagnosed. "I have never been satisfied that any of the cases that come under my observation could be considered genuine vicarious menstruation in the sense given by some authors"—FISHBERG,⁴ and it is mostly true.

Menstrual Hæmoptysis:—It has been observed that hæmoptysis in phthisical women most often occurs during the menstrual period.

SATTLER⁵ records, thoracoscopic observations of enormous hyperæmia of the lungs during the menstrual period, which subsided during the inter-menstrual period. This observation runs parallel to that of the clinicians who have noted elevation of temperature, increase in severity of cough and expectoration in the menstrual period.

Prognosis.—The prognosis in hæmoptysis depends upon the underlying pathology. Hæmoptysis is as a rule, a mere incident during the course of many illnesses mentioned before. Very occasionally, it has an adverse effect on the course of the disease. There is considerable truth in the statement that if the patient survives the immediate effects of hæmorrhage, the prognosis from the stand-point of blood loss is good *i.e.* the blood lost is rapidly replaced by the hæmopoietic system. Pulmonary bleeding alone very rarely causes death.

As over 50% of cases of hæmoptysis are due to pulmonary tuberculosis, we may discuss in greater detail, the prognosis of hæmoptysis in that disease.

Prognosis of Hæmoptysis in Pulmonary Tuberculosis. "When the hæmorrhage is not profuse, we must not conclude that the case is mild or that the lesion is not intensive" FISHBERG. "However, the type of hæmorrhage indicates roughly the nature of the underlying pathology, as under:—

Blood-streaked sputum, seldom associated with much constitutional disturbance, is said to be caused merely by localised active inflammatory hyperæmia, the red blood cells having migrated by diapedesis as in pneumonia. The prognosis is favourable.

Persistent hæmorrhagic sputum during the course of a case showing marked tuberculo-toxæmia indicative of active disease, is of serious import, in as much as it indicates an ulcerative process resulting from caseation and softening of the necrosed tissue with erosion of the wall of the arterioles, which ordinarily in a less active process get obliterated and thrombosed. Copious hæmorrhage in such a case, accompanied by small, soft and quickening pulse, lessening of temperature, and other evidences of collapse, is the result of ulcerating erosion of a large vessel in a case of acute phthisis, and may prove immediately fatal.

In a chronic case with cavitation in a patient who is on the road to recovery, a big hæmorrhage occurs like a storm out of a clear sky, as the result of rupture of the aneurysms of Rasmussen, that arise from the partly eroded walls of patent blood vessels coursing across, or in the walls of the cavity. Most often, patients recover from such hæmorrhages and they are rarely fatal.

In the bronchiectatic form of fibroid phthisis, sources of hæmorrhage, usually small but recurrent, are oozing from capillaries or arteries which traverse the granulations on the walls of the cavities. Occasionally, copious hæmorrhages occur from rupture of dilated and varicose blood vessels, passing through the walls of such cavities.

Influence of Hæmoptysis on the course of Phthisis.—"It may be said that so long as it does not prove fatal immediately, and this is rare (one out of a thousand deaths due to tuberculosis), it has no effect on the patient, nor on the disease"—FISHBERG⁴. WILLIAMS says: "To many patients, its occurrence seems beneficial rather than otherwise, for the congestion is thus relieved, and the system not materially

weakened by the loss of blood"—(quoted by FISHBERG.) Again, FISHBERG says: "I have seen many cases, in whom the disease took a turn for the better, soon after a more or less profuse hæmorrhage, and others in which the cough, anorexia, pains in the chest, etc., had ameliorated or disappeared after this accident."

Broncho-pneumonia as a sequel to pulmonary hæmorrhage is rare, if it occurs at all. The fever that comes on occasionally in afebrile patients after hæmoptysis is due to absorption of blood from the lungs and bronchi, but subsides within a week or so.

Finally, the subject of prognosis in pulmonary tuberculosis may be closed with the following apt remarks of FISHBERG.

"In hæmoptysis, the immediate and especially the ultimate prognosis depends less on the bleeding, its abundance or even repetition, than on the character and extent of pulmonary lesion and the symptoms which accompany or dominate the clinical picture, the subsequent course of the original disease—phthisis and the complications which may arise.

Treatment.—I. Introduction.—"It must be emphasized that pulmonary hæmorrhages often stop spontaneously, so that apparent excellent therapeutic effects of any of the numerous methods used must be interpreted with caution."—GOLDMAN.²

Although pulmonary bleeding rarely causes death, and has little effect on prognosis, yet there is much to be gained by the proper handling of the case, especially in so far as the saving of loss of an important tissue—the blood—is concerned.

Severe pulmonary bleeding is a medical emergency and its immediate treatment should have priority over the considerations of exact diagnosis, which should subsequently be elucidated by most careful physical, roentgen and laboratory examination.

II. Prophylaxis.—Serious hæmoptysis in pulmonary tuberculosis, as has been shown earlier, results from ulcerative erosion of the walls of pulmonary blood vessels, or the aneurysms on them, and admits of no better prophylactic measure than the correct treatment of pulmonary tuberculosis, most especially by pneumothorax and absolute rest in bed in open air. HUTCHISON¹⁵ says: "the infrequency of hæmoptysis is one of the more remarkable results of open air treatment of tuberculosis". Over-exertion, excitement etc., as exciting causes of pulmonary hæmorrhage, have recently been shown to have no etiological relation in the vast majority of cases. It appears that most hæmorrhages, especially those which are copious and fatal, occur during the night or when the patient has been at rest. BANG's special study of this problem makes a most impressive reading and is well worth quoting in full. "That among 2000 tuberculous patients in a sanatorium, the initial hæmorrhages came on while the patients were lying in bed or on a reclining chair in 69% of 354 cases, in 15% while they were dressing, sitting up in bed or just lying down, and in only 6% of cases while the patients were walking or working, and in 8%

The danger of retching and vomiting with its consequent ill effects on hæmorrhage is quite serious. However, HUTCHISON¹⁵, still recommends Pulv. Ipecac. in 5 gr. doses, repeated every 2 hours, or preferably Pulv. Ipecac Co., which combines the sedative effect of Opium as well.

3. *The Nitrites*:—MACHT (quoted by FISHBERG) found experimentally that nitrites cause a constriction of the pulmonary vessels and at the same time they are efficient peripheral and splanchnic vasodilators. SOLLMANN¹⁶ quotes more recent experiments contradicting the above statements. The clinician, however, still thinks it to be useful, but recommends larger doses than usual 10—15 drops of Amyl Nitrite, dropped on a handkerchief, which is placed before the patient's mouth and nose, as the best. Immediately, the face becomes red and congested and the hæmorrhage stops. It may be repeated several times during the day. The only ill-effect from this large dosage is a feeling of nausea.

4. *Nitro-Glycerine*:—It has slower, but more lasting effect than that of Amyl Nitrate.

Tab. Glyceralis Trinatris (B. P.) is given in doses of 2 tablets—3 or 4 times a day. The patient is instructed not to swallow, but to chew these tablets.

5. *Purgation*:—Mild purgation with Calomel or Hydrarg. cum. Creta is advocated by HUTCHISON¹⁵, partly to reduce blood volume, and to lower blood pressure. Others do not suggest their use, because of the possibility of more harm from straining and movement.

6. *Drugs effecting the Coagulability of the Blood*:—(1) *Sodium Chloride*:—A useful emergency house-hold remedy.

VON DEN VELDEN (quoted by FISHBERG⁶) has proved that, in man, swallowing 5—15 grms. of table salt increases the coagulability of blood within 5 minutes. Within one hour, the coagulability returns to its former intensity. Sodium Bromide has nearly the same effect.

5—10 grms. of salt or 3 grms. of Sodium Bromide, three or four times a day, may prove of immense value. In nervous patients, Bromide is to be preferred.

5—10 c.c. of 10% solution of Sodium Chloride given intravenously, or 50—100 c.c. of 25% Sucrose, or 5—10 c.c. of 5% solution of Calcium Chloride, are helpful.

With the above injections, care is to be taken that nothing leaks out; otherwise, it causes severe pain and even sloughing.

These act either by the action on coagulability, or by change in osmotic tension.

(2) *Calcium Lactate, Acetate, Chloride or Gluconate*:—There is no evidence that Calcium is deficient in subjects of pulmonary tuberculosis.

SOLLMANN¹⁶, commenting on Calcium therapy for bleeding, says: "The normal content of Calcium in the blood is more than is required

for coagulation; further increase of Calcium does not increase the coagulability. The experiments of VELDEN 1913, indicate that the coagulability is indeed, increased for a short time. This increase is also produced by equal quantities of Sodium Chloride, and is probably due to local action on the alimentary canal. It does not last beyond 20 or 30 minutes, and would, therefore, be useless."

GLEASON¹⁷ is responsible for the following statement about Calcium therapy in hæmorrhages:—

The effect of Calcium Chloride or Lactate is to increase the coagulability of the blood, but if too large a quantity of the drug is given, the opposite result is caused, namely, diminished coagulability. On this theory, 2 or even 3 capsules of 10—15 gr. may be given at intervals of an hour in severe cases, but the amount of 80 gr. should not be exceeded in as many hours. Even in cases, where hæmorrhage has not been completely controlled, if 80 gr. have been given within 80 hours, it is best to wait several hours before resorting to the drug.

Other authorities including FISHBERG also doubt the utility of Calcium, but suggest its use in the form of Calcium Lactate 10-20 gr. repeated 4-6 times a day on the principle, 'if it does no good, it will at least do no harm.'

D'AGOSTINO¹² draws attention to the occurrence of hæmoptysis following upon intravenous injections of Calcium. He thinks that it may be due to any of the following factors:

- (a) Embolus formed during injection, causing minute pulmonary infarcts.
- (b) Congestion of areas of disease in the lungs as the result of reaction to Calcium ions.

Sudden increase of sympathetic tonus raising blood pressure, and then rupturing diseased fragile vessels.

(3) *Congo-Red*:—It is the latest addition to efficient coagulants, and is credited with brilliant successes.

It is said to act by stimulating the reticulo-endothelial system. The phenomena observed in the blood after the injection are: monocytoysis, increase of fibrinogen and platelets, and shortening of coagulation time.

It is given intravenously in a dose of 10 c.c. of 1% solution, repeated if necessary in 24 hours.

Hæmorrhage stops after 1st or 2nd injection. Sometimes, 4 or 5 injections are indicated. Best results are obtained in moderate cases. Injections are well tolerated. It has to be injected carefully, because the colour of the blood in the syringe is not seen on account of the red colour of the solution. It is not caustic, leakage just leaving a red mark. There are no febrile reactions, except when the water is not pure. Ready-made ampoules are available, or a solution made in

distilled water may be sterilised in the autoclave or in a water bath at 100°C. for half an hour.

(4) *Biological Coagulants*:—"Fibrin Ferments and Thromboplastic stances."—The opinion of the Council of Pharmacy and Chemistry sums up their therapeutic properties in the following words:—"The Council holds that there is no evidence to warrant the internal use of these substances, and further that such use, on account of the danger from anaphylaxis from preparation containing animal proteins, is likely to be harmful until proper precautions are taken. There appears to be no evidence that this danger is connected with local application, but even before such use, physicians should enquire into the patient's history to determine, whether or not, sensitivity to these proteins exist." The clinicians have in their experience found the substances of little use in the control of hæmoptysis.

Normal Horse Serum:—"A specific constrictor substance is formed in shed blood, probably by changes in the formed elements rather than by clotting. A vasoconstrictor principle is derived from the breaking up of blood platelets. The constriction may play a part in hemostasis."—SOLLMANN.

Blood serum injection sometimes appears to help in hæmostasis. There are the same after-effects and dangers must be taken seriously, since the benefits are problematical.

FISHBERG's ominous warning with regard to the use of horse-serum must be borne in mind: "Tuberculosis is a disease which confers hypersensitiveness to all foreign proteins and I have seen repeatedly miliary tuberculosis following the administration of horse serum with a view of stopping pulmonary hæmorrhage."

The result of the serum appears in 12 hours. It is given in doses of 10-20 c.c. hypodermically, repeated in 12 hours, if necessary.

Human Serum or Human Blood:—"The action described above, for horse-serum applies here, with the added advantage of absence of anaphylaxis.

The human whole-blood or serum is given hypodermically, in doses of 10-20 c.c. repeated in 12 hours. There is no need for blood matching.

Blood Transfusion:—"Apart from making up the deficiency in cases of serious blood loss, and thus reducing shock, it provides new elements necessary for clotting, combined with the "specific constrictor substance", that SOLLMANN has described in shed blood.

It has to be given in small amounts (100 c.c.), drop by drop, repeated as required, because larger amounts rapidly given may continue hæmoptysis on account of increase of blood volume.

If blood transfusion is not possible, one might resort to tide the patient over a crisis to autotransfusion by elevation of the foot of the bed and by bandaging the limbs tightly from the tips up.

Producing More Thrombokinase in the System:—"With a soft pad or roller bandage, placed over nerves and larger vessels, a tight tourniquet is applied over both thighs to occlude venous but not arterial circulation. The pulse should still be perceptible—the patient feeling no pain. This is kept on for half an hour, and then applied to the arms. This procedure lessens the blood volume in active circulation, lowers blood pressure, helping nature to promote formation of a clot at the site of rent in blood vessels.

It is also said that there is increased production of thrombokinase in the tied limb, which, when passed into the circulations, helps in plugging the bleeding vessels by increasing the coagulability of blood.

Viper Snake Venom:—"It has a reputation of increasing the coagulability of the blood. Given in small doses, it promises to prove a potent hæmostatic agent. It is given intradermally in doses of .05 mg. dissolved in 1 c.c. of 1% Tricresol in normal saline, followed in 4 hours by 10 c.c. of 10% Calcium Gluconate.

7. *Internal Secretions and Vitamins*—*Parathormone*:—"BECKMAN¹³ quotes the testimony of GORDON, ROARKS and LEWIS as to the efficacy of Parathormone in those who have a long period of blood spitting after the subsidence of acute hæmorrhage. Dosage:—10 units of Parathyroid extract intramuscularly every second day, for 2 or 3 weeks.

In acute hæmorrhage itself 15-30 units repeated at 18-36 hours', intervals for 3 doses will develop the maximum effect possible by this therapy.

Adrenalin or Epinephrine:—"Its use by injection has been advocated by some workers on the belief that it causes constriction of pulmonary vessels, and because coagulation time is shortened due to increased production of prothrombin through its action on liver cells. But, these are more than counterbalanced by the increased cardiac action with the consequent raised blood pressure in pulmonary arteries. Pulmonary hæmorrhage is definitely increased (FREY and WIGGERS quoted by SOLLMANN.)"

Pituitrin has got a stronger constrictor action than Epinephrine on the pulmonary capillaries. The output of the heart is decreased because of diminution of oxygen supply consequent on coronary constriction. These factors make its application rational in pulmonary hæmorrhage and its use is advised in protracted cases.

Clinically, Pituitrin is probably not a useful remedy, as the literature lacks reports of its trial.

Vitamin D and Calcium:—"The utilisation of Calcium can only occur in the presence of vitamin D. It has, therefore, been considered more rational to combine the two for surer assimilation. The success of this combination is, however, doubtful on the same grounds as that of Calcium alone.

Vitamin C:—"It has no use in hæmoptysis, because, its action is on

the cement substance that joins the contiguous cells. There is, moreover, no evidence that tuberculous patients suffer from serious vitamin C deficiency.

We may expect real help from the newly described blood clotting factors under the name of vitamin K, but the subject is still being investigated.

Empirical Therapy of Pulmonary Tuberculosis.

1. 'Camphorated oil 5-10 c.c. of 25% solution is highly recommended and apparently stops hæmorrhage'—GOLDMAN.²

LUNDE (quoted by FISHBERG⁴) reports immediate cessation of hæmorrhage after the hypodermic injection of 3 c.c. of 20% camphorated oil.

FISHBERG himself does not think it superior in its effects to Emetine, and recommends its use in obstinate cases only.

2. Ammonium Tartrate is strongly recommended by MALTEI and ESCUDIES (quoted by GOLDMAN²). It is given daily in 10 gm. doses for 5 days.

3. Intravenous injection of 15 to 30 c.c. of a sterile solution of Sodium Citrate 30 parts, Magnesium Chloride 10 parts, water 100 parts (dose-varied according to the age of the patient), is very useful in stopping the hæmorrhage.—CHUNDRA¹⁴.

Drugs Contra-Indicated in the Treatment of Hæmoptysis:—Ergot, Digitalis, Hydrastis, Cotarnine (Stypticine) Alum, Tannic Acid and Lead are of no value.

Gelatin:—3 or 4 ounces of flavoured 10% jelly, three times a day is said to increase coagulability of the blood. The results are contradictory and its value is doubtful.

V. Surgical Procedure.—*Intra-tracheal* (by supra-glottic route). *Injection of Adrenalin.* ASCOLI¹⁶, in a letter to the British Medical Journal, brought to the notice of the English-reading medical profession, the successful and a simple method of supra-glottic intra-tracheal administration of Adrenalin for treating hæmoptysis. The technique is as below:—

"A source of light is placed in front of the patient, who puts out his tongue. The operator standing opposite, seizes the tongue between his left thumb and fore-finger, while holding with his right hand, a syringe filled with 3 c.c. of the drug (1 c.c. of 1-1000 Adrenalin diluted in 2 c.c. of water) and fitted with a canula of 2 mm. bore and 11 cm. length, bent at a distance of 7 cm. from the cone, so as to form an angle of 140 degrees. The canula is introduced the through tongue into the mouth as far as the epiglottis, and the patient is directed to breathe in deeply and slowly. The piston is then swiftly pushed down during an inspiration. "The entry of Adrenalin into the trachea is heralded by cough which is not severe and quiets down. There is no need of anæsthetising the pharynx, but it may be done by spraying with 4% Novocaine.

Results:—Success is claimed in about 90% of cases, the bleeding stopping almost immediately, the next sputum being just blood tinged.

If necessary, the administration of the drug may be repeated every 12 hours or every 8 hours (in worst cases) for 2 or 3 days.

ASCOLI referring to the work of PENNETTI (vide infra) is inclined to attribute this action to a factor of reflex nature.

Supra-glottic Intra-tracheal Injection of Water.—PENNETTI¹⁷ claims sterile distilled water to be as equally efficacious as Adrenalin in the above method. In his experience, if hæmorrhage fails to stop by intra-tracheal water injection (about 5 c.c.), Epinephrine fails also. The method is said to be successful in grave cases.

The action of water in constricting the bleeding pulmonary vessels is considered to be a reflex phenomenon due to the entrance of fluid into the respiratory tract in which the nature of liquid injected does not interfere.

Electro-Therapeutic Measures.—X-ray exposure of the spleen is advocated by NEDDERMEYER (quoted by GOLDMAN²) who states that it hastens blood coagulation.

Treatment by Subcutaneous Emphysema.—^{18,19} 200-300 c.c. of air is injected subcutaneously with a pneumothorax apparatus, Potain insufflating apparatus or large syringe, at the posterior axillary line at the level of 8th, 10th and 11th ribs. Upper part and front of chest is avoided on account of the possibility of spread of air to the neck and mediastinum. The method is undoubtedly simple in technique, efficient in its results and harmless.

BASU¹⁹ has reported very successful results in 4 cases, when Morphine, Calcium, Emetine and several injections of Congo Red had failed.

One can only surmise at the probable explanation of this curious phenomenon. There may be excessive production of thrombokinas. Exact studies at elucidating this point have yet to appear.

The simplicity and harmlessness of the method deserve extensive trial.

Artificial Pneumothorax.—The indication of artificial pneumothorax is considered seriously, when other simpler measures fail in severe cases and in cases of repeated hæmorrhages. It is indicated in tuberculous as well as non-tuberculous conditions. There is no question of contra-indications; for, it is an emergency measure. Subsequently, if it is found that collapse of the lung cannot be maintained successfully (i.e. hæmorrhage does not stop, or the patient is distressed), the air can be allowed to be absorbed or even withdrawn. The diseased side could be more probably guessed in unilateral cases, and in cases with cavitation. The patient's symptoms, physical signs, and X-ray findings help in probable localisation of the source of bleeding. There is, however, undoubted difficulty in bilateral cases. During profuse hæmorrhage, blood may be aspirated into the non-bleeding lung and produce all sorts of rales. In such cases, we are justified in inducing

a pneumothorax in the most probable side, because bleeding may stop even when the non-bleeding lung is collapsed.

Action of Pneumothorax:—1. There is compression and obliteration of smaller blood vessels as the lung collapses.

2. When the bleeding point is close to the surface of the lung, a small amount of air may compress it, resulting in cessation of bleeding with partial lung collapse.

3. Disturbance in the equilibrium of the thoracic organs may be effective in compressing the bleeding area, as probably happens with very small pneumothorax, or in cases of bleeding from contralateral lung.

Failures and their Causes:—1. Insufficient amount of air introduced. 500-800 c.c. of air is usually recommended in such cases. In some cases, larger amounts to cause complete collapse of the lung may be necessary before the bleeding stops.

2. The bleeding may not be coming from the lung with more extensive lesion (selected by us as the probable bleeder in a bilateral case).

3. The bleeding vessel may be in a cavity with thick rigid walls, or in a zone of firm fibro-caseous infiltration, so that safe intra-pleural pressure is not able to collapse it.

4. Pleural adhesions may not permit pneumothorax.

5. Occasionally, the bleeding may be aggravated on account of certain not readily understood factors.

Alternative Methods of Collapse:—1. Phrenicectomy or Phrenic avulsion.

2. Breaking of pleural adhesions through a thoracoscope.

3. Thoracoplasty.

Emergency Pneumothorax.—In copious and uncontrollable pulmonary hæmorrhage, when no apparatus is at hand, we may resort to MURPHY's method: (reproduced from FISHBERG⁶).

"Take an ordinary hypodermic needle, rub the sharp point dull on a brick, cover the butt end of the needle with cotton, which will serve as a filter of the air that is to enter, then insert the needle into the pleura at the point of election for the production of pneumothorax. The skin should have been painted with Iodine and punctured with tenotome. The idea is to let the air enter the pleural cavity through needle, the cotton filtering it as it enters, thus producing a pneumothorax. The finger placed over the butt end of the needle serves as a valve. As the patient inspires, the finger is lifted off the needle to allow the air to enter, and on expiration, the opening is closed with the finger. In that manner, you can pump the pleural cavity full of air to any desired degree of compression. If the patient becomes too cyanotic or the breathing is embarrassed, lift the finger from the needle and allow a little air to escape. The procedure

is now reversed. Close the end with the finger on inspiration and remove the finger on expiration, so that air will be pumped out instead of in."

Other Operative Measures.—*Bronchoscopy:*—In cases of undiagnosed hæmoptysis, bronchoscopy is indicated unless there is some special contra-indication. It is of special use in cases of broncho-lithiasis, foreign bodies, and tumours of trachea and larger bronchi, which may be treated directly.

Venesection in hæmoptysis is indicated in:—

- (1) Even slight bleeding in cases of high blood pressure
- (2) When bleeding by choking the air tubes is seriously interfering with respiration as apart from immediate relief, it will save the patient from the development of aspiration broncho-pneumonia.
- (3) Persisting hæmorrhages. SHORTLE (quoted by FISHBERG⁶) taught: "It is safer to bleed from the arm than from the lung." With the numerous methods outlined above, there may never arise the need for venesection, "but in desperate cases, in which there is evidently nothing to lose, it may be given a trial when everything else has failed" (FISHBERG⁶).

Diet in Hæmoptysis.—Hot drinks, tea, coffee and alcohol are contra-indicated in all types of hæmoptysis. With just streaked sputum, diet may not be restricted.

In moderate and severe cases, proceed as below:—

- (1) Starvation for a few hours.
- (2) Restriction of fluids to lessen blood volume and consequently blood pressure.

Ice pellets to suck and to moisten the tongue only.

With the stoppage of free bleeding, and while the sputum still contains blood, iced milk in small quantities, 2 ounces at a time, is given every 2 hours. The diet is gradually increased till regular normal diet is reached 5-6 days after complete cessation of hæmorrhage. Over-eating should be avoided.

Convalescence.—Absolute rest in bed as long as the patient is spitting blood.

If afebrile, he is allowed to sit up in bed while the sputum is just tinged with blood, and a few days later, he can just walk round the room, but keeping in comparative rest till his blood loss is recouped.

Febrile patients are kept under strict observation, and watched for complications.

The cough should be carefully controlled throughout this period. Bowels should be kept regular. There should be no straining and no physical exertion. Exposure to intense sun's rays and to cold should be protected from.

Residence at high Altitudes.—Patients with hæmoptysis do not do well at high altitudes but they should be treated there, rather than directed to travel back to the plains in that state.

There is no evidence that patients with proclivity to bleed, or who had hæmoptysis sometime ago, do not do well at moderate altitudes (2000-5000 ft).

The writer has found in his experience that, out of the various medicines described above, intravenous injections of 1% Congo Red 10 c.c. repeated daily for a few days together with a teaspoonful of Glycoheroin, in half an ounce of water twice daily, to stop the incessant cough, low diet, a regular action of the bowel secured by a tablespoonful of Agarol in milk, is the most successful therapeutic regimen. After the hæmoptysis has stopped by the various measures detailed above, treatment of tuberculosis is then best carried out by "Swain Perles" a preparation of gold in combination with most easily assimilable form of Calcium in cases running a low temperature between 99°-101°F., sold by Messrs. Beli Ram & Bros., Chemists, Anarkali, Lahore.

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Drugs used in the Treatment of Asthma

With Reference to their Actions, Indications and Modes of Administration

BY

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ASTHMA, speaking more correctly bronchial asthma, is at present, regarded as a symptom-complex characterized by paroxysmal and recurrent attacks of 'wheezy', expiratory type of dyspnoea, which depends upon narrowing and partial obstruction of the smaller bronchi and bronchioles due to muscular spasm and swelling of the bronchiolar mucosa.

The attacks may last from a few minutes to several hours and the patients may suffer from severe distress. These attacks may come at comparatively long intervals or may occur every day or several times during the night over a long period. In simple cases, relaxation of the bronchial muscle is usually complete between the attacks, but in long standing cases, complicated usually with emphysema and chronic bronchitis, the respirations are wheezy and the patients are more or less distressed at all times (status asthmaticus). The distress becomes much more aggravated during acute attacks, which may supervene on the chronic condition.

The bronchial muscles, blood vessels and glands are under the control of the autonomic nervous system; the broncho-constrictor and secretory fibres are derived from the para-sympathetic division (the vagi), whilst the dilator and vasomotor fibres arise from the sympathetic. Afferent fibres from the lungs run in the vagus.

It is postulated that in asthma, the bronchiolar spasm and turgescence are due to the hyper-excitability state of vagus and an abnormal reflex action is set up by stimulation of the vagal broncho-motor centre in the medulla.

A large number of possible causes have been put forward to explain the abnormal reflex and they may be divided into (a) predisposing and (b) exciting causes.

1. *Predisposing Causes*:—(a) Heredity—It seems to play an important role in the causation of asthma, positive family history of asthma or of any other allergic manifestation viz. eczema, urticaria being obtained in nearly 50% of asthmatic patients. It is believed to be of a Mendelian dominant type and relates particularly to the nervous system.

(b) Age } do not seem to influence much the incidence of
(c) Sex } asthma. Males are supposed to be affected slightly more than females. Asthma can occur at any age, but usually begins in childhood or at least at a comparatively young age.

2. *Exciting Causes.*—They are :—(a) Naso-pharyngeal irritation—chronic catarrh, a polypus, adenoids, diseased tonsils, deflected nasal septum etc.

(b) Infections of the respiratory tract—which may be anything from simple catarrh to a gross tuberculous infection of the lungs.

(c) Neurosis—viz: emotion, apprehension, suggestion, fear etc. often times precipitate attacks in persons who are predisposed or are already asthmatics.

(d) Digestive disturbances—over-loaded stomach or an over-loaded rectum, are often known to cause an acute attack of asthma. Late meals are commonly known to be a cause of nocturnal attacks of asthma and are avoided by many asthmatics.

(e) The inhalation or ingestion or injection of substances to which the patient has developed a sensitivity (allergy). This something which is usually of the nature of a protein, may come from without viz: emanations from hair, feathers, pollens; serum; food-stuffs (cereals, vegetables, fruits etc.) and chemicals (drugs)—(extrinsic asthma) or from within viz: bacteria or products of bacterial infections and products of perverted metabolism, (intrinsic asthma). Hypersensitiveness to a foreign substance (mostly a protein) is now-a-days recognized as a basal factor in asthma. A specific substance can occasionally be identified and by its removal away from the patient or by a process of desensitization, attacks can be prevented.

Because of a large number of diverse possible causes, asthma offers a wide scope for treatment and for use of a large variety of drugs. Theoretically, the treatment consists in finding and removing the cause. Unfortunately, it is seldom found possible to do so. It is only in a few exceptional cases that the patient is completely relieved of his distress with a free and easy breathing by a change of environment, viz: a change to a healthier locality or admission in a hospital. As a rule, the cure of asthma is a difficult problem, and in allergic cases, even when an offending agent is elucidated, it is often extremely difficult to remove it or to desensitize the patient against it. However, much can be done to mitigate the severity of attacks and to prevent their frequent recurrence. Drugs have to be used (1) for the relief of dyspnoea and distress during an attack and (2) for the treatment of the underlying causes of the disease in order to prevent recurrence of attacks. On account of the large variety of factors that may operate in different patients, there could be no common plan of treatment and the choice of drugs and of their combinations has to be made in accordance with the actual state of the patient at the time of examination. Chronic sufferers have often to try one drug or one particular combination of drugs after another, until they find something which gives them relief and creates confidence in its use.

A. Drugs for Relief of Attacks:

I. Inhalations.—When an attack of asthma is mild, simple

measures are often sufficient to relieve it. A number of drugs—particularly belonging to the Solanaceæ order—such as Stramonium, Lobelia, Datura, Tobacco leaves and others, when ignited, give off fume which, if inhaled, relieves the bronchial spasm and they form the main ingredients of a number of popular asthma powders such as Hemrod's, Bliss's, Potter's asthma cures. These preparations also contain a certain percentage of Nitre (Potassium Nitrate) which, when burnt, is converted into a small amount of Nitrite which relaxes the muscle, when inhaled with the fumes.

The following formula (SIR JAMES SAWYER'S) for an asthma-powder is contained in the B. P. C. and is representative of a large number of formulæ for such preparations :—Powdered Stramonium 50 parts, powdered Lobelia 10 parts, Anise 12 parts, black tea leaves 6 parts, Potassium Nitrate 26 parts and oil of Eucalyptus (as a flavour) 1 part. About half a teaspoonful of this powder is pressed by the fingers into the shape of a cone which is then ignited at the top and the fumes are inhaled. Such a powder may be mixed with some tobacco and rolled into cigarettes and then smoked.

The objection to the use of such powders is that the fumes (which contain carbon particles) are likely to irritate the bronchi and set up bronchitis. There is also the danger of fire and the smell of the smoke is often disagreeable to many individuals.

II. Sprays.—Lesions of the nose and sinuses are common in asthma and are often regarded as a cause for the disease. It is found that drugs which reduce congestion and sensitivity of the irritated nasal and nasopharyngeal mucosa, when locally applied, most often bring relief and abort an attack, especially if it is mild. For this purpose, drugs such as Adrenalin, Ephedrine, Chloretone, Cocaine and various volatile oils such as Camphor, Menthol, oil of Eucalyptus are used in the form of spray or nasal drops in a number of suitable combinations. The following is one of the many formulæ devised for antispasmodic sprays—(EDENS) :

℞ Atropinæ Sulphatis	... gm. 0.03
Cocainæ Hydrochloridi	... gm. 0.3
Potassii Sulphatis	... gm. 0.3
Glycerini	... c c. 3.0
Liq. Adrenalini Hydrochloridi	ad c c. 3.0 Misce.

This inhalation is best administered by an inhaler driven from an oxygen cylinder, though other inhalers may be used. The patient inhales deeply with open mouth for one minute and then rests for from three to five minutes so as to give the remedy a chance to act. Generally, three to four inhalations of one minute each suffice to make respiration free and easy. The inhalations may be repeated several times a day without harm (FANTUS "Technic of Medication".)

Adrenalin and Ephedrine are commonly used alone or combined with volatile oils in the form of spray with success in aborting a mild attack of asthma. The spray may be watery and then the alkaloidal salts viz., Adrenalin Hydrochloride or Ephedrine Chloride are to be

used. For oily spray, the alkaloid base is to be prescribed. The following is a formula for an oily spray containing Ephedrine.

R Ephedrine (alkaloid. pure.) ... gr. iv
Paraffini Liquidum ad ... 3i Misce.

The object of such sprays is chiefly to shrink the nasal mucous membrane, still it is likely that they may have an effect on some naso-bronchial reflex. The physiology of such an action is, however, not clearly understood.

A newer method has been developed by GRAESER and ROWE for administering Adrenalin by inhalation instead of the ordinary hypodermic route, and for this purpose, a solution ten times stronger than the official solution of Adrenalin is used. (For details, refer under "Adrenalin" *Infra.*)

III. Drugs of the "Adrenalin Series".—These drugs and particularly Adrenalin, play an important role in the treatment of asthma, for they effectively relieve distress and dyspnoea during an acute attack.

1. *Adrenalin or Epinephrine*:—It is the most effective and dependable drug in the treatment of asthmatic attacks. It stimulates the receptive substance connected with the endings of the dilator sympathetic nerve fibres in the bronchial muscle, relieves the spasm and dilates the smaller bronchi and bronchioles. It also reduces congestion and secretion of the bronchial mucosa by constricting the bronchial blood vessels.

Adrenalin is put up in three forms for therapeutic purposes and is administered hypo-dermically, by inhalation and very seldom by mouth as it is destroyed in the stomach and becomes quite ineffective.

1. When injected under the skin in doses of 2-8 minims (sometimes upto 15 minims) of its official watery solution "Liquor Adrenalin Hydrochloridi (1:1000)", Adrenalin produces its effects almost immediately and is the treatment of choice in a vast majority of cases. Injections must always be resorted to when the attack is severe from the beginning or the spray has failed to bring relief to the patient.

The dose is important and depends upon the severity and the length of time since the attack has set in. It must always be the aim not to give too much of Adrenalin in order to avoid its disagreeable side-effects *viz.*, pallor, tachycardia, palpitation and præcordial distress, tremors, sweating, anxiety and nervousness. 2-3 minims of Liquor Adrenalin Hydrochlor (B.P.), if given subcutaneously within a few minutes of the onset of an attack, will give an almost instantaneous relief. On the other hand, if dyspnoea has been present for half an hour or more, even 10-15 minims of the solution may give little or no relief. In such cases, injections of Adrenalin have to be repeated every hour or even half an hour till complete relief is obtained and respirations become free and easy. It has been found that in severe cases, large quantities can be used with safety. A case has been described in which 30cc (1oz) of Liquor Adrenalin Hydrochloridi was used in a day without any harm (WALDBOTT, J.A.M.A. 110; 1423. 30-4-38).

It is often advisable, in suitable cases, to train patients to inject Adrenalin themselves in the same way as diabetics are taught to self-administer Insulin, in order that they may be able to abort an attack without delay and with the minimum amount of the drug.

Intravenous use of Adrenalin is fraught with grave danger *e. g.* of causing acute cardiac dilatation, pulmonary oedema or ventricular fibrillation terminating in death, and should be made only under certain exceptional cases and with utmost precaution.

A question has often been asked whether Adrenalin, if used over a long period, is likely to produce injurious effects. On this point, opinions are divided. In clinical practice, very few or no cases of gross injury on either heart, liver, kidney or any vital organ of the body have been reported (RACKEMANN and THEILER, *Journal of Allergy* 7: 523, July 1936), but in laboratory animals under experimental conditions, Adrenalin after repeated injections has been known to produce injurious effects such as atheromatous changes and calcareous patches in the aorta and other large blood vessels and also chronic myo-endo-and peri-carditis (SOLLMANN, *Manual of Pharmacology* 1936.)

(2) Of recent years, a slow acting form of Adrenalin has been devised by KEENEY and his co-workers (KEENEY "A slowly absorbed Epinephrine preparation—*John Hopkin's Hospital Bulletin* 62: 227 March '38) and is marketed by Messrs Parke Davis & Co. It is made by suspending the powdered Adrenalin base (0.2%) in sterile pea-nut oil in such quantities that 1 c.c. of the preparation contains 2 milligrammes of Adrenalin. One dose ranges from 0.5 to 1.5 cc of the suspension, but it is advisable to begin with a comparatively small dose *viz.*, 0.5 cc and to watch the effect produced as in some individuals, local troublesome reactions such as redness and local swelling of the skin are caused.

This preparation though not a cure for asthma, is a marked improvement over the ordinary official aqueous solution. The advantage claimed for the newer preparation is that it is very slowly absorbed and has a comparatively very prolonged action, the relief lasting for as long as 15 to 16 hours. It has been stated that in cases of status asthmaticus, which required 9 to 12 injections daily, it was possible to reduce the number of injections to 2 or 3 per day by the use of this slow acting preparation. As it takes some time to act, it is injected intra-muscularly late in the evening, in order that the patient may have a comfortable night. For the same reason, in acute attacks, an injection of the ordinary watery solution of Adrenalin (1:1000) should precede, by about half-an-hour, the administration of the slow-acting preparation in order to bring the attack very soon under control.

(3) A strong solution of Adrenalin (Epinephrine), (1:100) is now marketed together with a special nebulizer for use in the form of spray, which does away with the necessity of ordinary Adrenalin injections.

which, on account of trouble, pain and expense, are not much liked by the patients. The efficacy of Adrenalin spray, however, much depends on the ability of the patient to inhale the spray (finer particles of the drug suspended in air) and so to bring the drug in direct contact with the bronchiolar mucosa. It has been noted that inhalation of the strong solution with 3-4 squeezes of the bulb of the nebulizer ordinarily brings about relief within a few minutes, even if the attack is severe. But it is essential that the patient knows to squeeze the bulb just when he is breathing in.

The patient is to be carefully instructed in the use of the nebulizer. A small amount—8 to 10 drops—of the 1 : 100 solution of Adrenalin is put into the nebulizer by means of a dropper before each treatment. The nozzle is placed just inside the open mouth, and the patient takes a deep inspiration as he squeezes the bulb of the nebulizer. The amount of inhalation varies—the dosage has to be regulated according to the effect produced; the number of inhalations and the number of times the bulb is compressed need to be regulated to suit individual requirements. Some patients find that to obtain relief, it is necessary to inhale until cough occurs. Very often, dryness of the throat is complained of, which may be relieved by rinsing the mouth out with some water soon after inhalation.

If the spray fails to act, then the ordinary 1 : 1000 solution is to be subcutaneously injected to obtain relief. In case of relief being brought about by the spray, it may be repeated in an hour or two, but the patient should be warned against the frequent and indiscriminate use of the strong solution as it is likely to set up irritation and inflammation of the tracheal and bronchial mucosa.

It must be clearly noted that the strong solution is for use as a spray and not as an injection. Many mishaps have been known to occur from inadvertently injecting the strong solution instead of the ordinary more dilute (1 : 1000) solution.

2. *Ephedrine*:—Is an alkaloid obtained from a variety of species of *Ephedra* but generally from the Chinese drug, Ma Huang (*Ephedra Vulgaris*) known 5000 years ago and now sold in Chinese stores in small brownish green sticks. It is believed to act upon the same structures as Adrenalin though according to some, the point of attack is not on the receptive substance but rather upon the muscle itself. It is likely that it acts on both the structures. It produces effects of the same nature as Adrenalin and overcomes vaso-constriction and reduces congestion and secretions of the turgid bronchiolar mucosa. It, however, differs from Adrenalin in several respects *viz.*, (1) Its action is slower in onset taking 20-30 minutes to develop and (2) lasts longer for 2-3 hours; (3) Its effects are milder and are less reliable. (4) It is more tonic than Adrenalin. (5) It can be given by mouth.

In fact, the use of Ephedrine in acute attacks is disappointing. It, however, is capable of controlling minor attacks and serves as a good prophylactic, perhaps acting psychologically, for preventing recurrence of acute attacks. Ephedrine has a tendency to produce nervous

excitement and will often keep awake small children and some patients—especially neurotic individuals and women. For this reason, Ephedrine is often combined with nervine sedative drugs chiefly Luminal (Phenobarbitone), Amytal, Acetyl Salicylic Acid, or Phenacetin. The following combination has been found to be useful and is popularly presented.

℞ Ephedrinæ Hydro-Chloridi ... gr. $\frac{3}{4}$.
Pheno-Barbitoni (Luminal) ... gr. $\frac{3}{4}$.
Acidi Acetyl-Salicylici ... gr. iv.

Misce. Pone in caps. I. Sig. one capsule t.d.s.

Ephedrine often causes dysuria and retention of urine in old people and in them it should be used with care. It is also known to occasionally cause nausea, vomiting, sweating, skin eruptions, palpitation, tremor and general nervousness. Caffeine is stated to increase the severity of the symptoms. Care has to be exercised to avoid giving Adrenalin and Ephedrine in a way that their effects may overlap.

Ephedrine is administered by mouth as its Hydrochloride or Sulphate in doses varying from $\frac{1}{4}$ -1½ grains,—on an average $\frac{3}{4}$ grain—as pills, tablets, capsules, syrup or as an elixir—the formula for the last being given below:—

℞ Ephedrine Hydrochloridi ... gr. viii.
Elixir-Aromatici (U. S. P.) ... $\frac{3}{4}$ iv.

Misce—Sig. 1-2 teaspoonfuls once a day or more often at intervals of several hours according to the relief obtained.

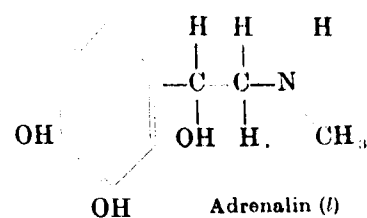
Ephedrine Hydrochloride is also marketed as a sterile solution in ampoules for hypodermic administration. On account of the slow action and of the possibility of nervous excitement, Ephedrine is best taken soon after the evening meal instead of at bed-time.

Ephedrine is also prepared synthetically and is marketed under the proprietary name "Ephetonin." It does not possess any advantage over the ordinary Ephedrine.

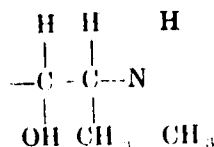
An isomer of Ephedrine *viz.* Pseudo Nephrene (Dextro-rotatory) is prepared and used in asthma but so far, it is not known to excel the older drug.

3. *Two Compounds*—*Synephrin* and *Neo Synephrin* closely related chemically to Adrenalin and Ephedrine have been prepared and introduced into therapeutics for use in asthma. The advantages claimed for these preparations are that they are less toxic though much weaker in action than either Adrenalin or Ephedrine and their action is slow and more prolonged.

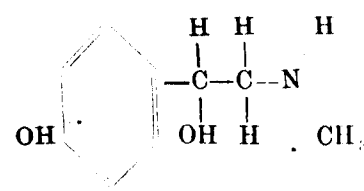
Synephrin is given in 1-3 grain doses either orally or by hypodermic injection. It is not found useful in severe attacks. No disagreeable side-effects have been observed. (THOMMEN 1931).



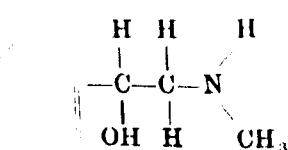
Adrenalin (l)



Ephedrine (l)



Synephrin (d)



Neo-Synephrin (l)

Neo-synephrin Hydro-chloride is used like Ephedrine locally in the nose usually in watery solutions containing from 0.25 to 1% of the drug.

IV. Drugs of the "Atropine Series":—Atropine occurs in a number of plants such as Belladonna, Hyoscyamus, Stramonium, Scopolia, Mandragora, Duboisia and others belonging to the order Solanaceae. These drugs also contain a mixture in varying proportions, of other alkaloids which are very much akin to Atropine in structure as well as in action. The alkaloids at first isolated were mixtures and these mixtures were given names according to their origin *e. g.* Daturine, Duboisine etc.

These drugs have long since been popularly used in the treatment of asthma, and they owe their action to Atropine and the related alkaloids.

1. *Atropine* depresses the terminal vagal nerve endings in the bronchial muscle, relieves spasm and dilates the bronchioles. It also markedly diminishes the secretions of the bronchial mucous glands by a similar action on their nerve supply.

Atropine and particularly the preparations of the crude drugs are far less useful than Adrenalin in the treatment of acute attacks of asthma. They are very slow in their action. Atropine given hypodermically is effective only for 20-30 minutes after the injection, and this is of no use in an emergency. But its action, when once obtained, lasts for several hours. However, Atropine, when given in properly graded doses, has often been found to succeed where Adrenalin and Ephedrine had failed *e. g.* in certain cases of status asthmaticus or where they cannot be administered for a particular reason. Some cases of asthma are said to have been permanently cured by Atropine given orally for some time. Atropine can with advantage be used in conjunction with Adrenalin, the two having different points of attack on the bronchial muscle. Great variability

in the action of Atropine has, however, been observed in some cases; in some cases, it proves very effective in very small doses whilst in others, it fails to give relief even when given in comparatively large doses. It should be usually pushed to the point of causing dryness of the throat to obtain relief.

Certain individuals are known to show great susceptibility to Atropine, and in them, even when given in minute amounts or locally applied, it produces undesirable symptoms, such as, disturbances and blurring of vision, difficulty in speaking and swallowing, intense dryness of the throat, great thirst, vomiting and occasionally nervous excitement passing into delirium.

Atropine is administered as its salt, Atropine Sulphate in doses varying from 1/250—1/60 grain either locally as spray, or as inhalation or tablets (sublingually) or as a 1% solution by mouth or as hypodermic injection. Crude drugs containing Atropine and the related alkaloids are given in the form of their respective liquid extracts or tinctures usually in cough mixtures. They are found useful, particularly to ward off attacks during quiescent periods.

2. *Eumydrin* or *Methylatropine Nitrate* is a synthetic compound of Atropine considered to be more prompt, but less enduring in action and less poisonous than Atropine. It occurs as white crystals and is readily soluble in water. It is given in doses of 1/60—1/20 grain chiefly as an hypodermic injection.

3. *Hyoscine Hydrobromide*—an alkaloid, very closely related to Atropine, is much less or seldom used in the treatment of asthma. It is much less effective than Atropine as a broncho-dilator and has a tendency to depress the respiratory centre. It combines also an hypnotic action and is given in 1/200—1/100 grain doses as an hypodermic injection. There are great individual variations in the response to Hyoscine and, therefore, in its toxicity, the variable toxicity is due mainly to idiosyncrasy and partly to the uncertain composition of the commercial samples.

4. There are several other drugs, *e. g.* *Lobelia*, *Grindelia*, *Euphorbia* (*Pilulifera*), etc., which though not containing Atropine or a similar alkaloid, produce effects, which are similar to those of Atropine and are used in the treatment of asthma. They are not effective for acute attacks, but are only useful during quiet periods to prevent attacks from recurring.

(1) *Lobelia* (B. P.):—Contains Lobeline—an alkaloid, which behaves more or less like Nicotine and depresses the ganglia on the course of the vagal nerve fibres after briefly stimulating them. It thus relaxes the bronchial spasm and is given in the form of its official ethereal tincture in doses of 5—15 minims. It irritates the stomach and acts as a nauseant expectorant rendering the mucous secretion of the bronchi more fluid.

Lobeline stimulates the respiratory centre and is used in cases of narcotic poisoning. (Dose 1/4—1/2 gr.)

The preparations of Lobelia seem to vary much in strength and toxic symptoms have sometimes followed their use. In any case, Lobelia is inferior to Atropine and not useful in acute attacks.

Lobelia is burnt and its smoke is inhaled during mild attacks of asthma with much relief. It enters into the composition of many asthma powders or cigarettes.

(2) *Grindelia* contains an amorphous resin which is probably the active principle. It is said to relax the muscular coats of the bronchi and diminish the secretion of mucus. It is, therefore, used in asthma, particularly in cough mixtures or combined with other anti-spasmodic drugs. It is given in the form of its liquid extract (B. P. '14) in doses of 10—20 minims repeated at hourly or two hourly intervals at the onset of an attack.

(3) *Euphorbia* (*Pululifera*) has been used in the treatment of asthma in the form of its tincture in doses of 10—30 minims repeated several times a day. The following prescription represents the formula of a proprietary preparation popularly used in asthma.

℞ Extracti Grindeliæ Liquid	...	℥ xv.
Tincturæ Euphoræ Pululiferæ	...	℥ xx.
Liquoris Trinitrine (B. P.)	...	℥ ss.
Sodii Iodidi	...	gr. ii.
Spiritus Chloroform	ad ...	3 i. misce.
Dose	...	3 ss—3 i t. d. s.

V. Opium and its Derivatives — They, but more particularly Morphine, are time-honoured remedies and occupy an important place amongst drugs used in the treatment of asthma. Morphine usually, gives prompt relief even when all other drugs have failed and the patient falls to sleep, undisturbed for several hours. It is unknown whether the action is exerted on the muscle directly or on the peripheral nervous structures. It may be perhaps a central sedative action. In animals, on the other hand, Morphine and other phenanthrene alkaloids have been shown to cause increased tone and contraction in many forms of smooth muscle *viz.*, intestine, ureter, bronchial muscle, etc. Because of the very chronic nature of the disease, the routine use of Morphine in spite of its beneficial effects has strongly to be deprecated. Patients are known to soon develop tolerance to Morphine and the other Opium alkaloids, requiring larger and larger amounts to obtain relief and later an unsatiable craving for the drug (habit formation). Individuals also vary widely in their susceptibility to Opium and its alkaloids. In some, Morphine not only fails to give any relief but on the contrary, it greatly aggravates and prolongs the asthmatic condition. In others, specially women and neurotics, instead of relief, Morphine often produces excitement and sleeplessness. Nausea and vomiting are frequently produced by Morphine, specially soon after its administration or while its effects are passing off. In the very young as well as in the very old, Morphine is considered to be dangerous even when given in minute doses, on account of its tendency to unduly

depress and paralyse the respiratory centre. It is the belief of many that Morphine often deals a final and fatal blow to the patient in status asthmaticus.

For reasons given above, the use of Morphine is justified only when Adrenalin and allied drugs have failed and it is urgently necessary to relieve acute distress and to provide mental and bodily rest to the patient. Under such circumstances, out of the many preparations and derivatives of Opium, nothing acts more promptly and more certainly than Morphine, which is given as Morphine Hydro-chloride or Sulphate as a subcutaneous injection. The dose of Morphine should be just enough to produce the desired effects and varies from $\frac{1}{8}$ — $\frac{1}{2}$ grain.

Codeine is another alkaloid of Opium and possesses actions which are very much similar to those of Morphine, but it is several times weaker both in action and toxicity. It is found more useful as a cough sedative than in the treatment of acute paroxysms. It is given as Codeine Phosphate in doses of $\frac{1}{4}$ —1 grain in capsules, in tablets or pills; and it may also be given as a linctus in the form of Codeine Phosphate (B. P. '14) in doses of 30-60 m.

Papaverine is an (isoquinoline) alkaloid of Morphine differing from Morphine in structure and certain of its actions. It acts directly on the smooth muscles of the bronchi and dilates them, especially when they are spasmodically contracted. It enters into the composition of several proprietary medicines for asthma. It is available in tablets ($\frac{1}{2}$ grain each) and in ampoules containing $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ grain of the alkaloid.

Heroin Hydrochloride or Diacetyl Morphine is a synthetic preparation made from Morphine and is used like Codeine mostly as a cough sedative. It is several times more tonic than Morphine and has the same or rather greater tendency to induce habit. In animal experiments, it is known to produce vaso-constriction much greater than caused by Morphine. Its use in asthma cannot be recommended. It is either injected subcutaneously or given orally, preferably as a linctus, in doses of $\frac{1}{2}$ — $\frac{1}{8}$ grain.

Dilaudid (Dihydromorphinone Hydrochloride) Eucadol (Dihydroxy-codeinone) and Dicodid (Hydro-codeinone Acid Tartrate) are newer synthetic derivatives made of Morphine and Codeine respectively and are extensively used as narcotics in Germany and are claimed to possess several advantages over Morphine. They are all given in practically the same dose $\frac{1}{2}$ — $\frac{1}{8}$ grain and are marketed in tablets, in ampoules and in powder form.

Omnopon also known as Pantopon is a proprietary preparation purporting to contain all the alkaloids of Opium in their natural proportions but four times the strength of Opium. Its action principally depends upon its Morphine content (52%) and is not thought to be superior to that of Morphine. It is available in tablets containing

approximately $\frac{1}{2}$ grain (1 c.c. of a 2 % solution). Hypodermic dose varies from $\frac{1}{2}$ to $\frac{3}{4}$ grain.

Opium (crude) and its preparations are not serviceable for the treatment of acute attacks, but in between the attacks, they may be prescribed in small doses as a cough sedative and to ease milder form of dyspnoea. The following preparations are suitable for internal use:—

- | | | |
|--|-----|-----------------------------------|
| (1) Opium Pulveratum | ... | $\frac{1}{2}$ –3 grains. |
| (2) Pulvis Ipecacuanhæ et opii | ... | 5–10 grains. |
| (3) Tinctura Opii | ... | 5–30 minims. |
| (4) Tinctura Opii Camphorata | ... | 30–60 minims. |
| (5) Trochiscus Morphine et Ipecacuanhæ | ... | (= $\frac{1}{2}$ grain Morphine.) |

VI. Anæsthetics.—The use of anæsthetics in asthma is a new method and requires a further trial before any opinion can be pronounced.

1. Ether-in-oil (1 ounce Ether in 2 ounces of Olive oil) has been tried per rectum. It is stated that this mixture can be given upto 4 to 6 ounces and be repeated on successive nights or on the same night without risk of depressing the respiratory centre.

2. Avertin in doses of 25 to 30 milligrammes ($=\frac{1}{2}$ to $\frac{3}{4}$ grain) per pound of body weight in 3 % solution has been tried per rectum as an enema slowly introduced and found adequate to induce relief.

3. Paraldehyde is often given per rectum in amounts of 1-4 drachms diluted with normal saline at bed time. In this way, it is found to produce an immediate effect and induce a condition of drowsy stupor. Danger to the respiratory centre is not great.

4. Chloroform, when a few whiffs are inhaled, brings about relief but it is too dangerous to give a bottle of Chloroform to the patient.

VII. Hypnotic and Analgesic Drugs.—Chloral Hydrate (10–20 grains), Barbiturates such as Amytal ($\frac{1}{2}$ to 3 grains) and Luminal ($\frac{1}{2}$ to 2 grains), Potassium Bromide and Paraldehyde (oral) have been used and found serviceable in cutting short an attack of asthma and in easing respirations. The Barbiturates require special care in their use and they may produce hyper-sensitiveness and give rise to cutaneous lesions such as urticaria, erythema or eczema, and often to gastro-intestinal symptoms. Seldom, asthma is increased. Aspirin (or Acetyl Salicylic Acid—5-10 grains) and Antipyrine (or Phenazone—5-10 grains) have of late, been extensively used in asthma. Their use also requires caution though they are much less injurious than Morphine and its related alkaloids. Perhaps, because of its very free use, cases of hyper-sensitiveness to Aspirin are most frequently met with. It is the very people in whom asthma is very severe, that develop sensitivity to drugs. Antipyrine often gives rise to undesirable and toxic reactions. It is known to cause a severe diminution of

white cell count, particularly polyponuclear cells (agranulocytosis) due to its toxic effect on the bone marrow. These drugs are combined with advantage with either Ephedrin, or Caffeine or both.

VIII. Nitrites.—They relieve asthma by directly depressing the bronchial muscles which are in a more or less spasmodic contraction. One of the time-honoured method for inducing nitrite effect is by burning paper impregnated with Potassium Nitrate or Saltpetre and inhaling the fumes which contain a small amount of nitrite. Nitrites in common use are:—Amyl Nitrite, dose 2-5 minims by inhalation; Nitro-glycerin (Glyceryl Trinitrate) in the form of its two official preparations viz. Liquor Glycerylis Trinitratis, dose $\frac{1}{2}$ to 2 minims and Tabella Glycerylis Trinitratis ($=\frac{1}{2}$ grain of Nitro-glycerin), Sodium Nitrite, $\frac{1}{2}$ -2 grains, Erythrol Tetranitrate (Dilute), $\frac{1}{2}$ -2 grains and sweet spirits of Nitre (Spiritus Ætheris Nitrosi), dose 15-60 minims. Nitrites often give rise to disagreeable symptoms such as throbbing in the head, flushing of the face, headache, eructations, nausea and vomiting, accelerated pulse and a feeling of giddiness and weakness.

Amyl Nitrite may be carried by the patients in thin glass capsules which are broken in an handkerchief and the vapour is inhaled just when they feel somewhat heavy breathing. The relief is immediate but short-lasting. For prolonged effect, Sodium Nitrite or Nitro-glycerin tablets may be used. Sweet spirits of Nitrite is a very convenient form for use in mixtures, and is usually to be preferred. From a clinical standpoint, Nitrites have been found to be of very little value in asthma.

Benzyl Benzoate and other Benzyl ester compounds are reputed to relax all forms of smooth muscle including the bronchial muscle. They act directly on the muscle just like Papaverine and Nitrites. However, clinical investigations have tended to show that Benzyl Benzoate given in therapeutic doses is entirely without effect upon the bronchial muscle and it has of late greatly fallen into disuse. Larger doses produce irritation of the gastro-intestinal mucous membrane. The beneficial effects are supposed to be due partly to suggestion and partly to reflexes from the taste and the mild gastric irritation. Benzyl Benzoate also known as Spasmodin is a colourless oily fluid with aromatic odour, and it is given in 2-5 min. doses in capsules or in 10-30 minim doses of its commercial 20 % solution in alcohol in water or as an emulsion.

IX. Purine or Caffeine Derivatives.—Caffeine and the related purine compounds sometimes give relief in asthma. The action is believed to be partly psychic and partly bronchial for in guinea pigs, Caffeine relieves the bronchial spasm produced by Peptone or muscarine. It is also considered possible that it acts by stimulating the respiratory centre to greater effect.

Caffeine is used in capsules and in powders, whilst its salt Caffeine Citrate may similarly be used or in solution in doses of 1-5 grains. Caffeine Tri-iodide (dose 2-4 grains) has been successfully used in asthma by DR. R. BILLIMORIA (Bombay), who states that "it is

those cases where dyspnoea is present every night for days and days, with rather easy respirations during the day, that are easily benefited". He prescribes the drug in capsules which are known by his name and contain the following combination:—Caffeine Tri-Iodide 2 grains, Arsamin $\frac{1}{4}$ grain, Valerianic acid 2 minims, Greek Extract of Belladonna, $\frac{1}{4}$ grain, Reduced Iron 1 grain. Two to three capsules are daily given.

Aminophylline or Euphyllin:—It is a double salt or a mixture of Theophylline with Ethylenediamine which is primarily used as a stimulant to heart and a diuretic in cardio-vascular diseases. It dilates the bronchioles and relieves severe paroxysms of asthma which have not responded to Adrenalin. It is given either orally as Tablets containing 1-1 $\frac{1}{2}$ grains, repeated 2-3 times a day, or as suppositories containing about 5 grains each, or as deep intramuscular or intravenous injections. Ampoules containing 4 grains in 2 cc. of the solution are available and for intravenous injection, the content of one ampoule is diluted with 10-20 c.c. of the 5-10 % glucose or normal saline solution. In status asthmaticus, one ampoule may be injected daily for 5 or 6 days with much benefit. Theophylline alone is much less soluble and cannot be used as an injection. It is given by mouth as tablets in 2-4 grain doses.

X. Oxygen and Helium.—It occasionally happens that in spite of treatment, patient fails to obtain relief and asthma continues. In such an intractable case, oxygen is found to be useful and should be administered preferably through a rubber catheter passed through the nose. Oxygen tents, which are seldom or never used in this country, should prove to be very effective, firstly because it becomes possible through their use to attain very high concentration of oxygen (as much as 100%) in the air breathed by the patient and secondly because they provide almost perfect air conditioning and eliminate dust and other foreign substances which, acting as allergens, keep up the asthmatic condition.

BARACH (1936) recommends the use of Helium mixed with oxygen in status asthmaticus. He points out that a mixture of oxygen and helium is much lighter when compared with a mixture of oxygen and nitrogen as occurs in the air and therefore is better able to pass through the partially occluded bronchi and bronchioles. The method has been perfected by LOVELACE W. R. (Proc-Mayo Clinics 13. 790—1938) and for details, the original article may be referred to. Helium is very expensive and not yet available in India.

XI. Intravenous Glucose Injections.—In certain intractable cases, intravenous injection of about a litre (1000 cc.) of 5% to 10% solution of Glucose given very slowly (at least an hour) has been found useful. A stronger solution (50%) given in amounts of 50 to 100 c.c. intravenously has been recommended with a view to withdraw fluid from the congested bronchial tissues.

XII. Transfusion of whole Blood.—This has also been recommended in severe cases of asthma. The donor must be a healthy and non-allergic

person and needs to be fasted for sometime before bleeding lest the patient should be sensitive to some food the donor may have recently taken. It goes without saying that the blood is matched beforehand.

XIII. Iodized Oil.—A number of workers, BALLYEAT (1935), ANDERSON (1936), MANDELBAUM (1936), CRIEF (1937) and others have reported on the good effect of introducing Iodized oil into the bronchial tree through a bronchoscope. Iodized poppy seed oil is instilled in doses upto 20 c.c. and it seems to have a good effect on the bronchial infection besides helping to force out bronchial plugs and purulent material. The details of the treatment are important and it should be carried out only by a fully qualified expert. It is stated that if the oil is retained, it is likely to act as a foreign substance and to set up pneumonitis.

B. Drugs for Cure of Asthma.—For cure of asthma, fundamental back-ground of the disease requires treatment and here also drugs may play an important role.

A large majority of cases are now believed to belong to extrinsic type in which the underlying cause is an allergic or atopic hypersensitivity to a food or a dust or a chemical (drug) which is either ingested or inhaled in the body. The ideal method of treatment in such cases is elimination of the offending agent. On the other hand, asthma of the intrinsic type is supposed to be caused by some infection lurking either in the respiratory passages, most frequently in nasal sinuses, or elsewhere in the body forming a definite focus e.g. in gall bladder, bad teeth, etc., or by abnormal products of perverted metabolism which may be due to imbalance of endocrine functions, e.g. in obesity, gout, pregnancy etc.

In all such cases, attempts are to be made to remove the focus of infection, to correct metabolic processes and to build up body resistance and to restore the healthy condition of the mind whichsoever may be responsible for the asthmatic state.

I. Specific Desensitization.—Whenever an offending agent is found but is impracticable to remove, attempts are made to desensitize the patient against it. This is usually done by preparing an extract of the offending agent or autogenous vaccine if offending organisms are found, and injecting it in gradually increasing doses at appropriate intervals.

II. Non-specific Desensitization.—In most cases specific desensitization is almost impracticable or rarely worth while, and it becomes necessary to adopt the alternative method of "non-specific desensitization" which may be carried out in a variety of ways. The idea underlying this form of treatment is to cause a sort of shake up or a disturbance between certain physiological functions, but what these disturbances are and how they are caused is not at all known. These disturbances are grouped under the collective name "Protein shock" and are generally accompanied by a short fever. The following substances are used for producing non-specific protein shock:—

1. **Armour's Peptone:**—A 33% of the dry Peptone solution is

injected intravenously at a very slow rate, with an initial dose of 3 minims which is increased by 1 min. at bi-weekly or weekly intervals until 15 minims are reached. In some individuals, intravenous injections are followed by some disagreeable symptoms when Peptone may be injected intramuscularly. In France, Peptone is given orally in 7 grains doses filled in capsules.

2. *Whole Blood (auto-hæmo therapy)*:—5 to 10 c.c. of blood is withdrawn from the patient's vein and reinjected into his buttock. Injections are given twice or thrice a week, gradually increasing the quantity of blood upto 20 c.c.

3. *Milk and its Preparations*:—Whole milk, after being adequately sterilized is injected intramuscularly, the initial dose being 0.5 to 1 c.c. which is increased by 0.5 c.c. at bi-weekly intervals upto 2-3 c.c. Milk preparations such as Aolan are injected intramuscularly with initial doses of 1 c.c. which are gradually increased till 5-10 c.c. are given.

4. *Tuberculin*:—Koch's old Tuberculin is often used and in some cases, good results are obtained. The details of this method must carefully be learnt for which reference should be made to any appropriate text book on the subject.

5. *Histamine*:—Has been tried in doses of $\frac{1}{10}$ to $\frac{1}{5}$ grain, but its use is not without danger and is often attended by a number of disagreeable symptoms.

6. *Typhoid Vaccine*:—Is given in minute doses intravenously but there is no special advantage gained by this method whilst dangerous symptoms are of frequent occurrence.

7. *Insulin*:—In recent years, Insulin has been tried with a view to produce "Insulin shock" for the cure of asthma. The method is yet in the experimental stage. For details, original papers on the subject must be referred to.

8. *Sulphur*:—Is used in the form of 1% suspension in oil (*Oleum Sulphuris* or *Sulfosin*) which is injected deep intramuscularly in doses of 0.5 c.c. increased slowly to 10 c.c. This method is attended by pyrexia of short duration.

9. *Gold Salts*:—Various organic gold compounds such as Sano-crysin, Solganol etc., have been tried with varying success. Toxic symptoms are not infrequent during treatment.

II. Drug Treatment.—Several drugs have been found very serviceable as adjuvants in the treatment and cure of asthma and amongst these, Iodides occupy the foremost place.

1. *Iodides*:—The good effect of Iodides depends upon their stimulating the mucous glands, the secretions of which are rendered more watery and less tenacious and are easily expectorated. Iodides do not seem to affect the bronchial muscle.

Iodides in common use are those of Potassium, Sodium and

Ammonium and apparently there is no advantage in choosing any particular salt. It is definitely shown that the action of Iodides mainly depends upon the Iodine ion, the basic ions playing little or no part in their action. Still it is the belief of many that Potassium Iodide is more effective in asthma than the other two, Potassium ion behaving like Adrenalin in relaxing the bronchial muscle. Ammonium Iodide is said to be more liable to cause skin eruptions and disturbances of digestion than the others. Sodium Iodide is the salt of choice for purposes of intravenous injections as Sodium ion, being an ordinary constituent of the tissue fluids, is devoid of any action.

It is stated that Potassium Iodide, when given in small doses definitely prolongs the intervals between spasmodic attacks.

All the three Iodides are given in doses of 5-20 grains repeated 3-4 times a day. They are as a matter of routine administered orally in mixtures, or in tablets which are to be dissolved before being taken. Milk is considered to be a good vehicle for iodides as it is believed to lessen the tendency to produce symptoms of iodism. Iodides, mostly Sodium Iodide, are also injected intravenously in doses of 10 cc. of a 15% solution (= 15 grains). Ampoules containing the required dose are available in the market. It is claimed that by using the intravenous route, Iodides are better tolerated even when small doses by mouth are known to produce Iodism and further, it is possible to obtain a greater concentration of Iodides in the blood and a more definite pharmacological effect, though Iodides when given by mouth are known to be rapidly and completely absorbed. The injections are repeated on alternate days or at intervals of 2 or 3 days.

The dose of an Iodide and the duration of its use are important as excess of the drug sets up irritation of the mucosa and makes the matter worse. In certain refractory cases, omission of an Iodide is known to result in amelioration of the asthmatic condition. It is better to teach the patient to regulate his own dosage of the drug and when to take and when to omit the drug, the indication for the drug being a harassing and unproductive cough. In this way, the patient may be enabled to carry on the Iodide treatment on and off over a long period.

Individuals vary in their susceptibility to Iodides; in some persons, very small amounts are enough to produce symptoms of severe iodism, whilst in others, comparatively very large doses continued over long periods are necessary to produce any symptom of poisoning. The symptoms of iodism disappear as soon as the drug is discontinued: however, curiously enough, the symptoms may disappear in a few persons by increasing the dose of the drug. Very often, tolerance is produced and it is possible to administer Iodides in usual doses, a few days after, once the symptoms have disappeared on the discontinuation of the drug. Long, continued use of Potassium Iodide is likely to be followed by pustular skin eruptions, especially on the head and upper part of the trunk and a disagreeable taste in the mouth. Very rarely, symptoms of chronic poisoning viz. anæmia,

emaciation, nervousness, tachycardia and loss of sexual power may occur.

2. *Arsenic*:—Both inorganic and organic Arsenicals are used for cure of asthma. How the good effects are brought about is not known, but it is certain that in a certain percentage of cases, there is a decided change for the better in the condition of chronic asthmatics after Arsenic.

Amongst the inorganic preparations, *Liquor Arsenicalis* (Fowler's solution) B. P. is to be preferred as it allows variations in the dosage to be made very easily. On account of the tendency of Arsenic to accumulate in the body and of the idiosyncrasy possessed by a number of patients against it, it is safe to begin with a very small dose viz. 2 minims of *Liquor Arsenicalis* thrice a day, and to gradually increase the dose by 1-2 minims at bi-weekly or weekly intervals. The drug must be stopped at the slightest manifestation of the early signs of poisoning.

Amongst the organic arsenical preparations, only trivalent compounds such as Neo-arsphenamine (Neo-salvarsan, or 914) and Sulph-arsphenamine (Sulpharsenol) are used, the pentavalent compounds being found to be very toxic for ordinary use.

Neo-arsphenamine and Sulph-arsphenamine are given dissolved in 10-20 cc. of glass-bi-distilled water intravenously, commencing with a comparatively small dose e.g. 0.1 to 0.15 gm.; injections are repeated at intervals of 4 to 6 days, with a gradual increase in the dosage of drug till a maximum dose 0.45 gm. is reached. It is seldom safe to go beyond the dose. Sulpharsenol is often given intra-muscularly dissolved in a special solvent known as arseno-solvent. The injections are almost painless and ordinary reactions that sometimes follow an intravenous injection of Sulph-arsphenamine are avoided.

3. *Calcium, Cod Liver Oil and Vitamin D Preparations*:—These preparations are said to influence asthma by improving the condition of the bronchial mucous membrane and by diminishing the abnormal irritability of the bronchial muscle, which is perhaps due to the raised Calcium content in the blood. Calcium is given orally in the form of Calcium Lactate or Gluconate (dose 10-30 grains) in solution, in tablets or as powder, or in the form of Calcium Chloride (dose 10-30 grains) in mixture. Calcium Gluconate is also injected intravenously, less frequently intra-muscularly, in doses of 10 cc. of a 10 % solution. The injections are repeated daily or on alternate days.

Vitamin D is administered in the form of several Fish Liver Oils, chiefly Cod Liver Oil (*Oleum Morrhue*—dose 45-90 minims thrice daily) or Halibut Liver Oil (*Oleum Hypoglossi*, dose 2 to 5 minims) or in the form of the official preparation "*Liquor Calciferolis*, in daily doses 10-15 minims. (i.e. 2000-3000 units of Vitamin D.)

4. *Hydrochloric Acid* and more often Nitro Hydro-chloric acid with or without Pepsin are also being given. Good results may perhaps be ascribed to improved digestion.

5. *Potassium Chloride* is recommended to be given instead of Sodium Chloride, as it is often known to produce good results in some of the allergic conditions e. g. hay fever, eczema etc.

6. *Endocrine preparations* viz. *Thyroid, Parathyroid* may prove useful, if the particular endocrine glands are functioning subnormally.

In concluding, it would not be out of place to recall the fact that the patient requires to be treated and not asthma *per se*. The proverb "One-man's food may be another man's poison" holds too true in the case of drugs. Patients, and more particularly asthmatics, are known to vary widely in the response to drugs. It would not be unwise for the practitioner to consult beforehand the patient's experiences with drugs and to be guided accordingly in his selection of medicines. On account of hypersensitiveness to drugs so frequently met with, drugs should be given in the beginning in small doses, keeping the patient under careful observation. In case the drug is found to agree with the patient, it should be pushed in increasing doses till the maximum effect is produced or signs of intolerance manifest. Over and above, tact and patience are necessary requisites for the successful management of a case of asthma.

Physiotherapy in Respiratory Diseases

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THE respiratory organs are most susceptible to invasion of pathogenic organisms; for, with the exception of the skin, no other special organs are so exposed. The nasal cavities, the accessory sinuses including sphenoidal sinus and ethmoidal labyrinths, nasopharynx, larynx, trachea and bronchial tubes, branching ultimately into alveolar processes, are all exposed to outside infections. There are various pathogenic and non-pathogenic organisms, which normally inhabit the nasopharyngeal areas and many are borne by air to them. Droplet infections from infected persons are very common causes of respiratory diseases. *B. septus* can attack the nasal cavity, nasopharynx and throat and cause sneezing, running of the nose and usually run a benign course, having no power to invade accessory sinuses. *B. influenzae*, on the other hand, have the knack of invading the accessory sinuses, antrum, Eustachian tube, ethmoidal, frontal and sphenoidal cells and in symbiosis with *Streptococci*, sometimes, invade the lower respiratory tract setting up tracheitis, bronchitis and broncho-pneumonia. *Micrococcus catarrhalis*, the organism of common cold may, however, invade any part of the respiratory tract and may produce anything from nasal and postnasal catarrh, to tonsillitis, laryngitis, bronchitis and even asthma. *Micrococcus paratuberculosis* usually attacks larynx first, producing huskiness of voice followed by paroxysmal cough. It can, however, produce all the diseases like *Micrococcus catarrhalis*, *Pneumococci*—a variety of which ordinarily resides in the pharynx, usually the larynx first, besides nasal cavities—but when the resistance of the lungs is lowered by exposure to cold, malnutrition and such others, it attacks the lungs causing massive consolidation of pneumonia. The bacilli of Friedlander group usually attack the nasal passages causing nasal and postnasal catarrh, but they can also produce bronchitis and pneumonia. There are other organisms, like *Staphylococci*, *B. proteus*, *B. pyocyaneus*, which produce suppurative conditions of the accessory sinuses and of the mouth generally. In most of these affections, *Streptococci* come as symbiotic organisms, so that mixed infection is the rule rather than exception. Besides these infective organisms, allergy plays a part in causing varieties of respiratory affections, of which coryza and asthma are common examples. Whooping cough is caused by Bordet Gengau bacilli in combination with *B. influenzae* in large percentage of cases. Lastly and not the least, pulmonary tuberculosis is caused by tubercle bacilli.

Amongst all these diseases, bronchitis is the commonest ailment

in human beings. The commonest predisposing cause is coryza and influenza and the lowering of individual resistance from any cause whatever. Coryza usually comes on suddenly and unless the patient isolates himself at home, he not only disseminates the disease to other individuals by droplet infection, through sneezing and coughing, but will be himself liable to bronchitis and even pneumonia. The infants and children are particularly susceptible to infection and in them, even slightest bronchitis should not be neglected; for, if the inflammation spreads from bronchial tubes to the alveoli, fatal broncho-pneumonia may develop. Although the beneficial effects of fresh air cannot be over-estimated, yet these patients should not be taken out of doors but should take rest in a constant temperature. The habit of wearing warm clothing on the least appearance of symptoms of 'cold', should be discouraged, for it leads to an unhealthy condition of skin and preventing its power of adjustment to changes of temperature and pressure. But this precaution is not applicable to feet and legs, and for the use of a warm foot-wear during an attack of "cold", is a preventive measure. Smoking of cigarettes should be minimised. The local measures for preventing the 'cold' spreading into the lungs should be adopted, but in all these cases, the use of strong antiseptics should be avoided. Listerine, Glycerine, Thymol Co, Hexyl-resorcinol should be highly diluted, if used as a nasal douche, but normal saline is the best. Spraying of Chloretone inhalent, Paroleine spray compound or Broncho-vydrin may be very soothing to the mucous membrane of the nose and throat and may sometimes avert extension of infection to the lungs, but even the mildest antiseptics have negative chemotactic action against the protective cells of the body, especially the white blood cells and thus diminish the natural powers of the infected tissues to eradicate the infection, once it is well-established. Vaccines, both of natural and detoxicated varieties, have been extensively tried and their chief value has been found to be prophylactic, although in whooping cough and pneumonia, their therapeutic effect has been admitted. Certain new drugs, of the Sulphanilamide group, have been found to be most effective against Streptococcal and Pneumococcal affections, especially in combination with antitoxic serum.

A new non-specific method of treatment has been found to be extremely efficacious, practically in all forms of respiratory diseases. This is known as *Inductotherapy*. It has replaced the ordinary method of short-wave application with two air-spaced electrodes placed on opposite sides of the affected part. In inducto-therapy, an insulated coil is placed over the front or back of the chest, in respiratory diseases and a magneto-electric current is induced inside the chest by which equal heat is available to all the tissues inside the chest, which becomes hyperæmic. In the former methods, the parts are unequally heated and majority of energy is consumed by fat and bone, which are more heated than the other soft parts which require heat more than fat and bones. Storch's experimental observations on human capillaries at the bed of the nail, proved that the capillaries which remain closed, when others are patent, are reopened up by

induction of short-wave and the rate of circulation through the capillaries is accelerated and the presumption was that the latter effect was due to dilatation of the arterioles. In his discussion, he presumed that the same accelerated flow which was observed in normal capillaries, still occurred in inflammatory parts, where stasis of capillary flow is a characteristic feature of the circulation in the later stages of inflammatory lesion. This explains the rapid subsidence of oedema with regression or accelerated resolution, in which the dilatation of the arterioles and capillaries and increased circulation in the affected part also play an important role.

In acute inflammation of the nasopharynx, their adnexa and accessory sinuses, short wave therapy by means of special sinus pad electrodes and air-spaced electrodes gives immediate relief of pain, and the regression of inflammatory process is manifested by marked relief with amelioration of symptoms and diminution of secretions, if any. In our experience, we have found short wave therapy acting like a miracle not only in all acute infections of the nasal, buccal and pharyngeal mucous membranes, but also in chronic infections as well, which, in certain percentage of cases, resisted all other methods of treatment. The intensity of the current, choice of metres and duration of treatment is to be regulated in different cases. It must be remembered that every case presents special problems of its own but the physician will quickly be able to adjust all these matters after some experience. The application is almost harmless, if carried to excess and will not do much good, if underdose is given. Hence, there is usually no mischief by its administration. We should advise the following general rule for beginners. In acute cases, the intensity and duration of short wave current is to be lowered considerably and the frequency of application is increased by allowing shorter intervals between each treatment. Otherwise, capillaries are further dilated by the increased intensity of the current, without corresponding dilatation of the arterioles, leading to stagnation in the capillary circulation. The acceleration of the flow of capillary circulation should be the object of heat therapy, for this only leads to regression of the inflammation.

In this connection, it must be understood that the aim of the heat therapy is not only to dilate the capillaries but also to increase the capillary circulation by dilatation of the arterioles. In acute inflammation, capillaries are already dilated and the result is certain amount of stagnation of the capillary flow. In this case, the intensity of the current should be so lowered as to lead to arteriolar dilatation mainly leading to entry of more blood in the capillary area of the inflamed part. If high intensity of the current is given, the capillaries dilate more than the arterioles and hence partial stagnation occurs. The more stasis there is in the capillary flow, the more is the oedema and the more is the pain. Again, the more is the increase of the capillary flow the greater is the decrease of oedema and capillary stasis and the quicker is the relief of pain and other symptoms.

In later stages of inflammation, stasis in the capillary flow is the

main feature of the circulation. When the inflammation assumes chronic stage, short wave current chiefly affects the arterioles and produces acceleration of the flow of the blood together with reduction of stasis and rapid subsidence of oedema lessening the discharge, which lead to ultimate healing of the inflammation. In these cases, both intensity and duration of treatment should be quickly increased and the intervals prolonged. A little experience and careful observation of the sequence of events, will make a physician ascertain correct doses in each case. No hard and fast rule can be observed.

In laryngitis and tracheitis, the short wave therapy is almost a specific both in the acute and chronic stages. The hoarseness of voice very quickly disappears and the hacking ineffective coughs are quickly controlled, provided the patient takes rest and refrains from speaking and from exposure to cold.

In bronchitis, bronchopneumonia and pneumonia, the symptoms are quickly relieved and the progress of the diseases rapidly arrested. The intensity of the current should be reduced as low as possible but the frequency is decreased to two or three applications a day. The duration should be gradually increased from $\frac{1}{2}$ to 2 hours in the following manner:—First application— $\frac{1}{2}$ hour; Second application—1 hour; Third application—1½ hours; Fourth and subsequent applications—2 hours.

Inductotherapy should be administered by a single insulated wire made into a coil applied over the front of the chest, while the patient is lying on back. The coil should be applied on the back, on the second application, in the front, on the third application and so on till the patient passes through the resolution stage to complete recovery.

In cases of bronchopneumonia of infants, extreme caution is to be adopted especially in the presence of cyanosis and advanced capillary stasis. Unless the therapy is given at an early stage, when it aborts the disease in most cases, it is extremely difficult to gauge the effect of short wave therapy, however low is the intensity of the current given. One short application with induction coil should be tried and the effect watched carefully. If the cyanosis is increased, during or immediately after application of the inductotherm, the presumption is that it produced further dilatation of the capillaries, without compensatory arteriolar dilatation and resulted in increased stagnation rather than an acceleration of the flow. More frequently, however, cyanosis decreases with corresponding amelioration of the disease.

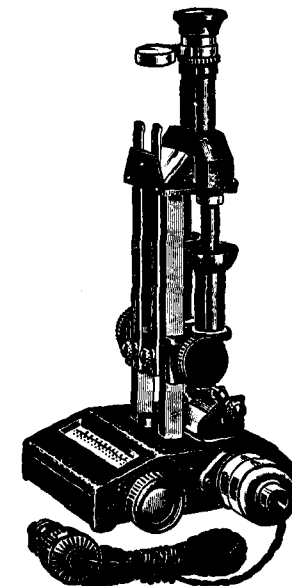
In the last three months, four cases of pneumonia were treated with inductotherm, where M. & B. 693 was not tolerated and which either produced increased cyanosis or acute gastro-intestinal irritation. In all these cases, pleuritis, pain, dyspnoea and cyanosis were quickly relieved. The failure of peripheral circulation and dehydration were guarded by injections of Cardiazol, Ephedrin and 50 c.c. of 12½% Glucose intramuscularly, for three or four days. It is important to remember

that current of minimal intensity, of long duration and frequent repetition of the application are essential for producing perspiration and for quickly bringing down the temperature, along with diminution of cyanosis, breathlessness and rate of heart beat. It is essential that the treatment should be continued during the whole period of resolution stage, as stoppage of the treatment soon after the subsidence of fever led to relapse of fever in several cases.

In abscess of the lungs, empyema thoracis, and pyopneumothorax-inductothermy is perhaps the best line of treatment, if surgical interference is to be avoided. The more we happen to treat these cases, the more we become enthusiastic about the efficacy of this new method of treatment, the rationale of which is to produce artificial hyperemia of the diseased parts.

We are giving careful trial to cases of tuberculosis of the lungs in selected cases, where surgical treatment is not possible. For example, in one case, we are treating the worse affected lung with artificial pneumothorax and other lung with a cavity with inductothermy. In another case, inductothermy is being applied to a widely adherent diseased lung, in which A. P. has failed. The result of these observations will be published at least after two years.

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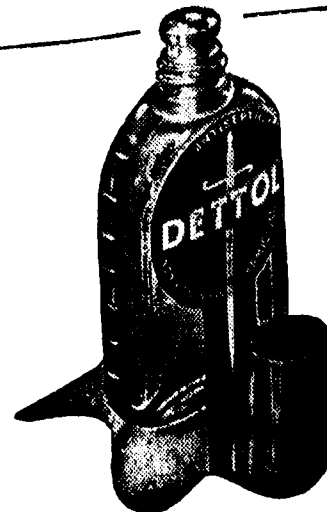
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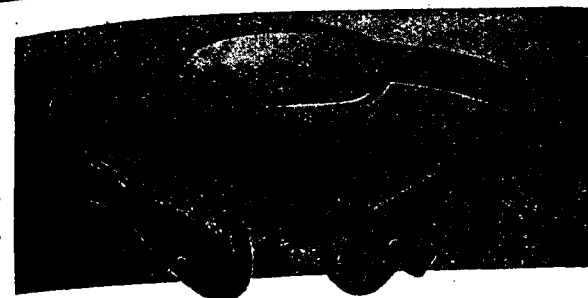
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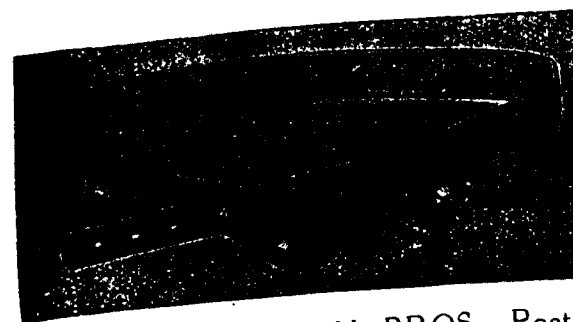
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