

The Antiseptic



A Monthly Medical Journal

Edited by

Panna Rau, M.L.C. & U. Krishna Rau, M.B., B.S.

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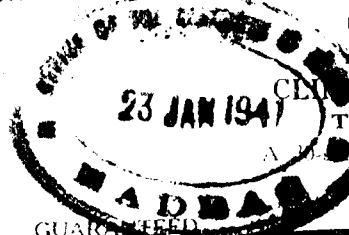
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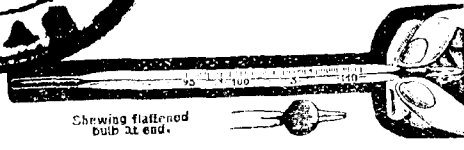
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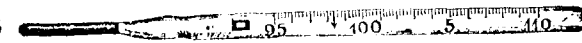
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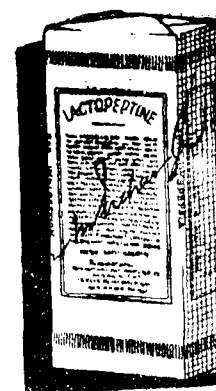


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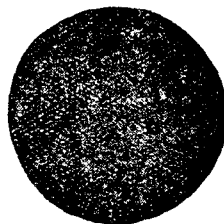
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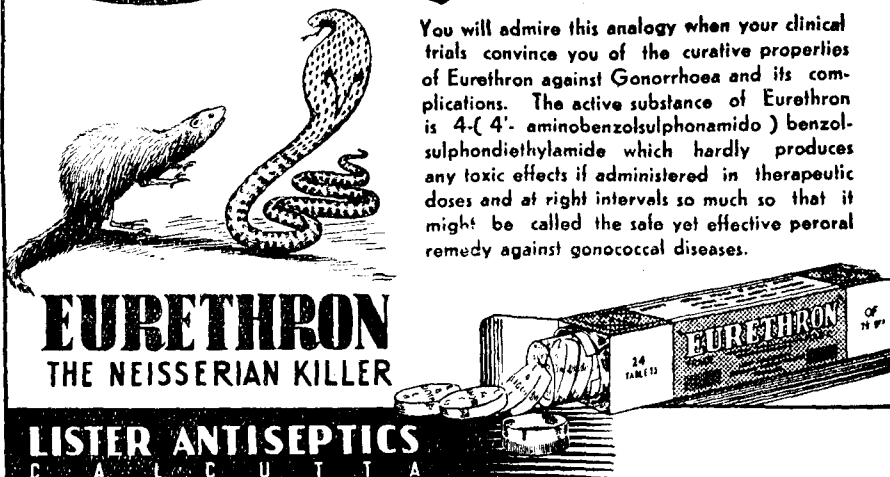
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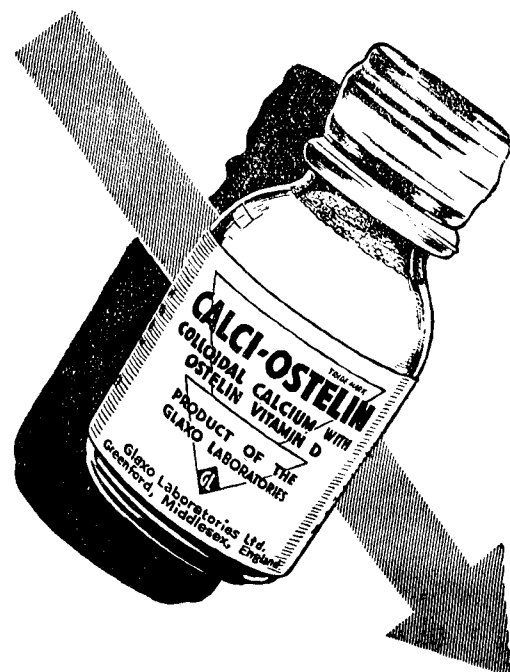
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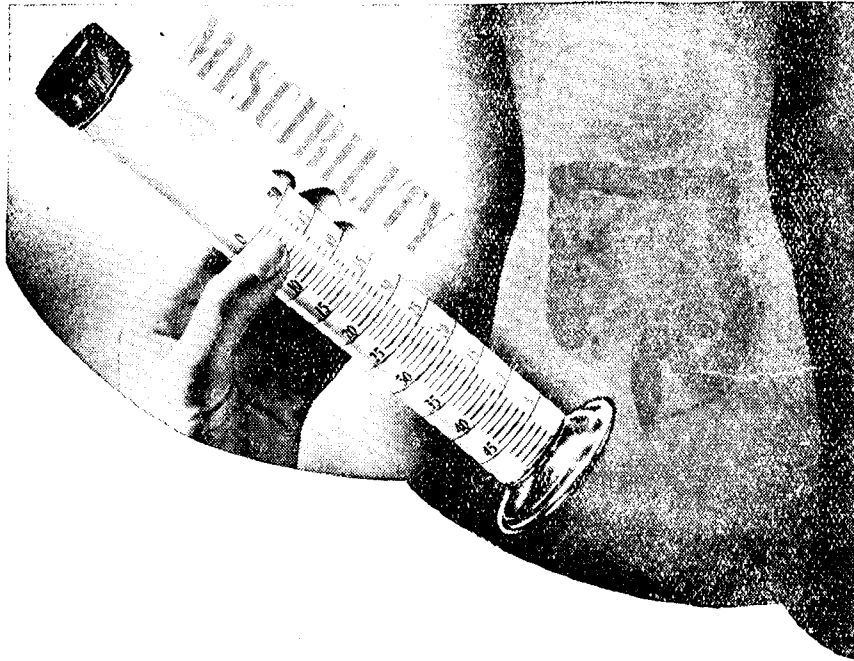
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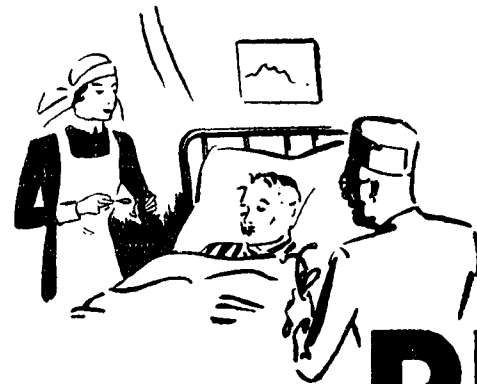
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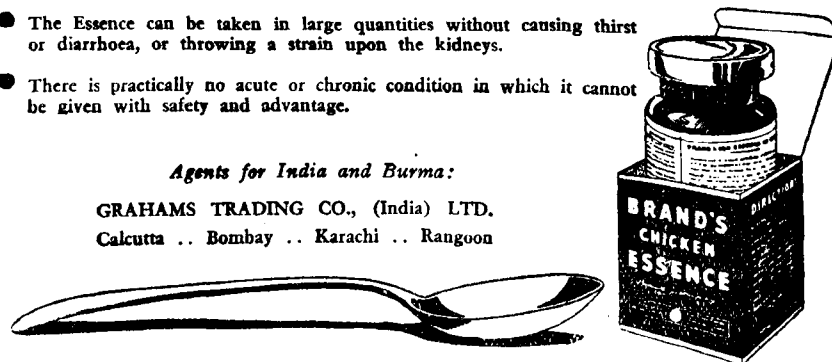
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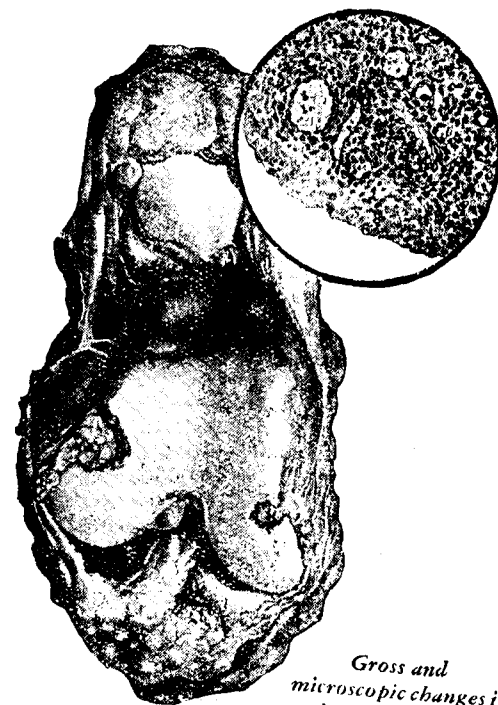
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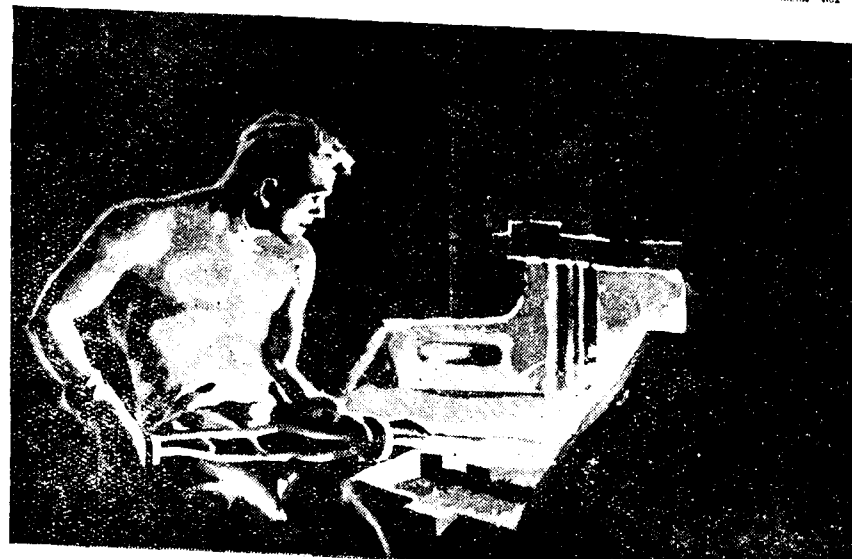
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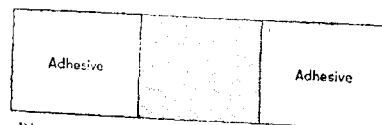
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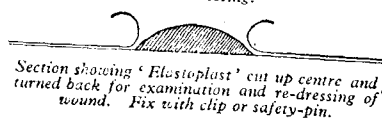
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Early Diagnosis of Pulmonary Tuberculosis

BY

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THE fact that about two-thirds of the cases sent to our Anti-Tuberculosis Clinics and Out-Patients' Department of our hospitals suffering from pulmonary tuberculosis, already have the disease in a moderately or far advanced form at the time of diagnosis, continues to be the source of grave anxiety to all workers in this branch of medicine.

Pulmonary tuberculosis begins in the large majority of cases as localised lesion, and the problem of discovering the really early case is made more difficult by the fact that the earliest stage of the tubercular disease of the lungs is often unattended by symptoms. This fact has been proved by the routine examination of apparently healthy young adults in whom radiology of the chest has definitely revealed the presence of early disease.

Methods of Detection.—When a patient suffering from pulmonary tuberculosis presents himself for examination, the history of contact with a known case of pulmonary tuberculosis is a helpful guide.

As the facilities for radiological examination in rural areas are far from adequate, insistence on an X-ray examination, may involve the patient in much loss of time, and considerable expense. For this reason, the following symptoms are suggestive and conducive in detecting the early manifestations of the disease:—

1. *Cough*:—Is usual in smokers; when it persists after a febrile attack usually, referred to as influenza, it should excite suspicion. Chronic bronchitis with cough and sputum is typical of fibroid phthisis in elderly people. Cough, worse in the morning, is of importance.

2. *Temperature*:—A slight evening rise in temperature is often

absent in early cases, but when present, it is important. Temperatures are to be taken at 6 A.M., 12 noon, 4 P.M., 7-30 P.M., and sometimes at 9 P.M., if the patient feels feverish. A rest temperature of 99°F. taken in this way, is definitely above normal.

3. *Loss of Weight*:—Important when it does occur, is often absent in early cases.

4. *Amenorrhœa*:—Is unusual but may occur specially in cases in which the onset of the disease has been preceded by long periods of overwork and worry.

5. The most constant and typical symptom of early pulmonary tuberculosis is *lassitude* which is often associated with anorexia and vague digestive disturbances. Many young patients are only too ready to find for themselves the causes for their symptoms which may be due to tuberculosis. For example, undue fatigue is often attributed to long hours of work and a chronic cough may be thought to be due to "catarrh" or to smoking. Needless to say, the vast majority of those who feel tired are not tuberculous, but it is impossible to lay down hard and fast rules as to which should be subjected to X-ray examination and which merely given a tonic or kept under observation.

6. *Hæmoptysis* is a symptom falling neither into the irritative nor into the toxæmic group. It is observed with considerably greater frequency in men than in women. The majority of patients never bleed throughout the course of the disease, however acute or chronic or wide-spread and fatal it may be. JAQUEROD noted hæmoptysis in 38.4 per cent in the first stage of the disease.

BOGEN, on the other hand, found that most of the hæmorrhage occurred in patients with advanced tuberculosis. Hæmoptysis may be of two types:—(1) Blood mixed with sputum. (a) Streaked sputum. (b) Stained sputum. (c) Apparent clots of blood instead of sputum. (2) Free hæmoptysis which may be a small free hæmoptysis or profuse hæmoptysis. (Every case of hæmoptysis must be diagnosed and treated as phthisis until definite evidence to the contrary is obtained.)

7. *Pain in Chest* may occur in every degree of intensity from a pain so acute that the patient cannot and scarcely dare breathe, to a dull ache. If there is no evidence of any other disease of the lung, of which the pleurisy may be only a feature, then the pleurisy may be regarded as primary and primary pleurisy in a young adult is a manifestation of tuberculosis.

8. *Hoarseness* is often an indication of laryngeal tuberculosis, but is not necessarily so; however, when hoarse voice is present for sometime, thorough examination of throat and chest should be made.

9. *Ischio-rectal Abscess*, leading to fistula-in-ano occurs in from 2 to 6 per cent of patients with tuberculosis.

10. *Cardio-vascular System*:—A pulse rate of 80 to 90 per minute and a low blood pressure are indicative of early pulmonary tuberculosis.

11. Sometimes, patients come to the doctor for *breathlessness* with or without fever and cough and on examination, diagnosis of pleurisy with effusion is made. There is no chest symptom, just as there is no sign, which may not occur at sometime or other in every disease of the lung.

Physical Signs.—No sign is pathognomonic of tuberculosis. Correlation of all the signs and the corroboration of such interpretation as a result of radiological examination, with the history and symptoms, constitute a picture from which one may strongly suspect or be almost positive that the causative factor is the tubercle bacillus. The final and positive diagnosis, however, is only possible by the finding of the tubercle bacillus in the sputum.

General Appearance:—There is the tired, strained look in the face, a certain pallor, possibly of wasting. The nutrition and complexion of patients who have had a period of rest in bed may fail to give any hint of the condition of the lungs.

Infection:—(1) The long, narrow ribbed, phthinoid chest, with sloping shoulders and winged scapulae. (2) The barrelled, round shouldered, emphysematous chest. (3) The scoliotic or kyphotic thorax whose bony deformities will complicate all physical signs.

Excessive sweating in the axillæ, and also abnormal dryness of the skin are both characteristic, but not pathognomonic of tuberculosis.

Palpation:—Palpation of the chest does not give much information; however, by it, the apex beat can be localised, the variations and excursions of the chest confirmed, and occasionally, a friction rub or vocal fremitus can be detected. The presence of enlarged glands should always be looked for, particularly in the posterior triangles of the neck and in the axillæ.

Percussion:—It is either direct or indirect. Direct percussion is the more delicate; by it, the resistance of the lung and pleura, rather than the sound, is obtained. By indirect percussion, loss of the tympanitic note indicates either fibrosis, consolidation, thickened pleura or pleurisy with effusion. Kronig's band can also be ascertained by percussion.

Auscultation:—The earliest change is a catchy, interrupted roughness, quite different from the true cogwheel breathing. Feeble breath-sounds and prolonged expiration are both fairly early changes. With increase in the fibrosis or consolidation, the breath sounds become more bronchial or tubular. Crepitations are rales which originate in the bronchioles. Whilst the presence of crepitations is a strongly suggestive evidence of active disease, their absence does not necessarily imply inactivity.

Crepitations may persist long after the disease is, according to all other standards, completely healed, and where there is absence of all symptoms and signs of tuberculosis, other than those of fibrosis. In the absence of crepitations, localized rhonchi are sometimes of value

for indicating the site of a lesion. Moist rales are better heard during the inspiratory phase following a short cough.

If an X-ray is available, the following things should be looked into.

Radioscopy.—Correct translation of shadows into pathological terms, have made X-ray examination a most important aid to diagnosis of intra-thoracic disease. It must be remembered that the tubercular lesions that we hope to see as shadows in the radiograph, are only partially opaque to X-ray—hence the picture taken should be soft showing more of details than contrasts. Whenever possible, the radiogram must be taken with the patient in the upright position and the film in front of the chest (Antero-posterior radiogram).

Areas of infiltration cast shadows which have irregular mottled appearance. The clearness of the outline of the shadow thrown by any tuberculous nodule in the lung depends largely on the position of that nodule with regard to the sensitive plate; the nearer it is the sharper will be its outline and smaller will the shadows be. Recent active areas of infiltration will give shadows of a more blurred outline than will older lesions. Fibrous tissue and scarred lesions generally will give a denser, cleaner shadow than that of active infiltration. Traction of the heart and mediastinum towards the side of the lesions is the only definite X-ray evidence of fibrosis. Calcified foci give the densest and cleanest shadows of all and are easily recognised.

The detection of cavities by radiography is full of pitfalls. In the stage of early infiltration, a small area of clouding is visible in the lung field about the size of an eight anna piece; this breaks down into a cavity which is shown by a central translucent area. The commonest site is just below the clavicle. If a cavity is embedded in the centre of a dense fibro-caseous material, its evidence is completely obscured, while its situation near one or both pleural surfaces is not difficult to recognize as a clear, roughly circular area with terraced irregular edges, and no evidence of lung structure within its borders.

Root Shadows.—It is extremely difficult to define what extent of shadows is permissible in the region of the roots of the lungs for the condition to be classified as "Normal" or preferably "Healthy."

The committee of the National Tuberculosis Association (Great Britain), decided that a single thickened trunk shadow extending to the apical periphery with a fan shadow, with or without pleural thickening must be regarded as evidence of tuberculosis, but that the trunk shadow alone must not be so regarded. Calcified lymph nodes are evidence of past, but not necessarily of present active tuberculosis.

Annular shadows are a matter of great controversy. They may be due to intra-parenchymatous cavities un-ruptured emphysematous bleb, localized pneumothorax and as the result of a localized pleurisy.

Laboratory Tests in the Diagnosis, Prognosis and Treatment of Pulmonary Tuberculosis

BY

K. Venkata Rao, M.B.B.S.

The Research Laboratory, Madras.

THE demonstration of the causal microbe or virus is the final test in the diagnosis of any infection. Pulmonary tuberculosis is one of such infections where diagnosis can be made with the microscope alone in a large number of cases. But, by the time the bacilli are seen in the sputum in a large group of cases, the disease has taken root well if not too firmly. The fight against such a treacherous foe as the tubercle bacillus, is to be begun none too early. Every advantage, early enough, must be taken of any sign and symptom referable to infection with this invisible microscopic and invidious foe. It is by now well known that absence of clinical pulmonary signs does not mean that the lungs are perfectly normal. It is not enough to establish the presence or absence of pulmonary tuberculous infection on the evidence of the patient's symptoms or on clinical signs presented by a casual or even a thorough chest examination in the routine way.

PROF. H. BETTY SHAW's remarks, "If medical attendants will help dyspepsia, will check cough, will give a tonic to relieve 'rundownness', will order fat foods and codliver oil to increase weight, and give certificates to present to employers now and again, not too often, recommending short periods of leave for convalescence etc.—the result is—that many patients come for help only when they are forced to do so by bankruptcy of their physical strength" are to be memorised by all practising doctors. Routine bacteriological and radiological tests are needed in nearly all cases which present themselves to us for early diagnosis. The conception of an early case has been changing.

In the past, the early clinical case was the patient who came to the doctor with symptoms or clinical signs. But if treatment of tuberculous cases should benefit the community by helping to prevent the more serious forms of the disease, to restore more persons to health and above all to *eradicate sources of infection*, it would be the object of every medical practitioner to get at the pre-clinical stage of these cases.

The patient has been coming to the doctor with some one or other of the cardinal symptoms of this disease and the examination of this case was done at the patient's or relative's request. In future, we must try to discover these cases before the onset of any signs or even symptoms, by the routine periodic examination of selected groups of individuals, particularly children and young adults in health and under the so-called normal conditions of living. This is only possible if social measures applicable to (1) the community at large and (2) to

the individual sufferer and his family in particular, ensuring protection of members of the community from this infection by the detection of the first signs of deviation from health of any of its members, be the aim along which health measures are successfully carried out (enforced, if necessary, by State control) in the fight against tuberculosis.

In this fight against tuberculosis, therefore, the detection of the pre-clinical type of the case is of paramount importance. The bacteriologist and the radiologist are to work hand in glove with the present-day clinician or his equivalent in the future—the public health officer—who should also be well versed in general medicine. Once a case has been diagnosed to be suffering from tuberculosis, in any of its forms, serial radiograms, taken periodically, record the progress or retrogression of this case. By laboratory tests, we are able to assess the individuals' resistance, powers of recovery and the extent of the toxæmia. We can, by these tests, choose the case that is likely to improve on routine treatment and to forecast its length, to select our cases for special treatment, and to state, with more exactitude than we could some years ago, immediate and ultimate prognosis. These skiagrams and laboratory tests are of immense use in the after-care of hospital and sanatorium-discharged cases, as they give an idea of the condition of the patient's metabolism, the impending nature of any exacerbation of quiescent disease and the resistance the body is maintaining.

Of the various laboratory methods in use in the diagnosis of the pre-clinical and clinical conditions of tuberculosis, the most important will be an attempt to detect the infecting organism, or the changes it has brought about in the tissues.

Even at the very outset of his quest, KOCH found the tubercle bacillus to be very unique in its behaviour. The usual method of demonstration perfected by him for the B. Anthrax failed him and he had to invent new methods. Thus, its reputation for singularity is so to say 'born' with the tubercle bacillus. Habitually attacking almost every organ and tissue in the body, producing various clinical conditions, one very often wonders whether all that passes for tuberculosis is due to the same organism. Therefore, a mass of laboratory technique and diagnostic method that is in keeping with the unrivalled multiplicity of its clinical and pathological manifestations has grown up.

These methods could be grouped under the following heads:—

1. Tests or methods of demonstrating the tubercle bacillus in excretions, discharges or tissues, in this case (for the purpose of this article), the sputum.
2. Tests to demonstrate infection of the patient with the tubercle bacilli.

This 2nd class can be subdivided again into two:—

- (a) *Specific Tests*:—(i) test of hypersensitivity to the infection, of Von Pirquet, Mantoux

intradermal test, subcutaneous tuberculin tests, WolfEisner's and Calmette's ophthalmic reactions; (ii) tests for immune bodies produced by the infecting organism like the complement fixation test, agglutination and precipitation tests.

(b) *Non-specific Tests*:—These are not of so much use as individual diagnostic tests but are of confirmatory help in the diagnosis and of great value in the prognosis and treatment of cases once diagnosed as tuberculous.

These are: sedimentation test of blood; the differential Schilling count, the Von Bonsdorf lobe counts, the lymphocyte monocyte ratio etc.—These also provide us with the indications for treatment and choice of the opportune moment for the particular form of treatment to be adopted.

The order in which these tests are usually performed is:—

A search for the tubercle bacillus in the sputum, pleural fluid, or the gastric contents or fæces in some early cases is performed by direct method of smear examination, failing which, by concentration method destroying all secondary contaminating organisms. Where even this search fails, cultures are made from the concentration specimens and finally guinea pigs are inoculated with this concentrate.

At the same time, intradermal Mantoux test is performed with a suitable dilution of old tuberculin. A radiological examination, screening and a permanent record by X-ray film of the chest are performed. Then the blood picture is studied, a smear from the peripheral blood is examined; from the smear, a Von-Bonsdorf lobe count or a Schilling count is performed. This gives valuable information about the activity of the disease and the resistance put up by the patient. A total W.B.C. count, hæmoglobin estimation and sedimentation rate test of R.B.C. are performed to assess the condition of the patient's resistance and his metabolic reaction to the presence of any form of disease. On the strength of all these tests, a diagnosis is made, a fairly safe estimate of the ultimate prognosis is arrived at and the lines of treatment are planned out. Taking up the direct examination of material, e.g. sputum for tubercle bacilli, it is all important to instruct the patient what to collect and how to send it to the laboratory. Whenever possible, sterile wide-mouthed glass-stoppered bottles which can hold about one ounce of fluid are best for use. The patient is directed to rinse out his mouth and throat with boiled and cooled water in the early hours of the morning soon after he wakes up from sleep. If there is no cough, an effort at coughing, performed several times, will bring up necessary muco-purulent material. This is spat out directly into the bottle reserved for the purpose by his bed-side. No water or antiseptics or lotion should be added to this early morning collection. About half a dozen such coughs will bring up enough material in most cases.

If there is no cough and when this morning effort at coughing does not produce any result, an early morning stomach wash is

performed and this is used for testing for bacilli after the necessary settling and concentration. Where even this is negative, the faeces may have to be tested frequently for tubercle bacilli especially in those cases which are suspected to be swallowing their sputum.

For the microscopic examination itself, the necessary muco-purulent bit of sputum should be chosen after transferring the material from the bottle into a sterile petridish placed on surface painted half white and half black, the black area enabling one to pick the material easily. This picked up material should be smeared on perfectly smooth and clear new slides preserved in alcohol and which should not have been used before for sputum examination. Staining after fixing over the flame should be done by pouring the stain on to the slide and warming it over a hot stage and the slides should not be immersed several at a time in baths of stains kept on for days, as the latter process is likely to dislodge flakes of the sputum from one slide and carry it on to another.

The most commonly used method—the Ziel Neilson's—is the best with the use of a Picric Acid or Brilliant-green counterstain, it is easier to pick out the red stained bacilli more quickly than against the usual Methylene blue background. At least 3 slides should be prepared from each specimen and the surface of the smear run over from end to end with the help of the moving stage to cover the entire surface of the stained area.

Where one specimen is negative, a repeated examination is to be made at least for three more times. Where, however, the first examination reveals bacilli, it is usual to confirm once or twice consecutively for the next two days. If there is only a single bacillus in one day's examination or even a few (3 or 4) bacilli seen, repeated examination must be made before a positive diagnosis is given.

In cases who come to the physician with definite history of pulmonary trouble and in whom expectorated material is available for examination, (1) direct smears are to be examined as above, if this gives a negative result, (2) concentration method of the available sputum is necessary on two more occasions. Here again, technique and methods have grown up with the increasing number of workers in the field. But any one method with which the bacteriologist is very familiar, is usually better than 2 or 3 untried or new methods. The antiformin method or the use of 6% Sulphuric Acid to concentrate the sputum has given us uniformly good results. The sediment from these tests is examined by the usual staining. Where the smears are negative, cultures are made on usual media—the usually preferred one is the Corper Uyei—potatoe medium, the next best is Dorsets egg medium. Often, it is the practice to plant the concentrate on tubes of both media at the same time.

The direct smear and concentration methods are quickest, the culture takes at least a fortnight to 3 weeks. Where these are negative and the patient is still suspected to be clinically positive for tubercle an

animal inoculation has to be done in rare cases with the concentrated sediment. Where no sputum is available for examination, but the patient comes to consult, giving a history of symptoms suggestive of pulmonary tuberculosis, a gastric lavage, first thing in the morning before he takes even a drink of water has to be carried out. About 50 to 100 c.c. of sterile pure distilled water is injected through the Ryle's stomach tube and the whole of the gastric contents aspirated out and the sediment from centrifuged deposit of this is examined by staining of direct smears, if negative, by concentration method and if still negative, by culture and animal inoculation. Here again, a single negative gastric lavage is not of much importance. At least three consecutive lavages should be negative before a decision is arrived at.

Finally, in the typical pre-clinical case discovered at a contacted examination or during tuberculosis surveys performed on groups of healthy persons the same process of attempting to cough up sputum, and gastric lavage has to be gone through. Not only have we to make a definite diagnosis as to the tuberculous origin of a minimal shadow lesion seen in the X-ray picture of the last two types of cases, but a definite decision has to be arrived at regarding the activity of the disease, and progressive or non-progressive character of the lesion seen. Especially is this true in the early lesions, even the apparently calcified spots being seen in children.

The radiological examination of the chest of all persons, children or adults who have a cough which has persisted for over 3 weeks is to be insisted on by the doctors and the education of the lay public regarding the importance of this method of diagnosis has to be thoroughly carried out by the physicians in charge of these cases as this is one of the most important tests in spotting out disease in the pre-clinical stage enabling us to fight the onset of tuberculosis in its earliest stages before the patient has become a potential source of infection. But as this is a subject too vast for the purpose of this paper and does not really form a part of this, the next routine test in the serial examinations of this type of case can now be taken up. This is the tuberculin test.

In all countries, the Mantoux intradermal test has superseded all other tests like the Pirquet's, Morro's, Calmette's etc., as this test has proved more sensitive than the others and permits of grading with scientific exactitude, the results obtained.

The theory on which this test is based is that when an individual is infected once with tubercle bacilli, in however small a quantity, the tissues of his body develop an allergy or are hypersensitive to tubercle bacilli or their extracts, after a short period of about 3 to 7 weeks. This hypersensitivity persists throughout one's life when once it has developed in the majority of people—in over 95%. So, if performed according to the proper technique using the latest P.P.D. (pure protein derivative from old tuberculin), this test detects all the infected

cases except those in the anti-allergic period and those too advanced cases where a definite diagnosis is never in question.

The Technique of performing the Test:—Until recently, 3 dilutions of old tuberculin a 1/10,000, 1/1000, and 1/100 in 0.1 c.c. quantities were used. The 1/10,000 dilution was injected intradermally first. If this gave a negative result after 48 to 72 hours, the next dilution was injected and so on to the 1/100 dilution. If this also gave a negative result, the case is, for all practical purposes, free from any tubercle infection. But as there were some pseudo-positive reactions due to the presence of non-bacterial proteins from the media, attempts were made successfully to obtain a pure protein derivative from the tubercle bacillus and this—the 'P.P.D.'—is now extensively used for the test. This being a stable compound, results are comparable with tests done by preparations obtained at different places or over long periods of time. This is now available in tablet form containing 0.0002 mgm. for the 1st test and 0.005 mgm. for the 2nd test, if the first is negative. For testing, one tablet is dissolved in 1 c.c.m. of diluent provided (a buffered salt solution of P.H. 7.4) in sterile tubes and when dissolved 0.1 c. cm. is injected intradermally with a tuberculin syringe. The test with the 1st strength is read after 48 hours. If negative, another test is done with the tablet of the 2nd strength—and this is read after 48 hours. These two doses correspond respectively to a 1/10,000 dilution and a 1/100 dilution of old tuberculin. The reading of the positive test is noted as a + if there is redness and definite oedema round the injected spot of more than 5 m.m. and less than 10 m.m. diameter; as ++ if the oedema is from 10–20 m.m. in diameter and as +++ if over 20 m.m. in diameter, and as ++++, if a marked redness and oedema with an area of vesicle or pustules or necrosis are seen. Slight redness and trace of oedema 5 m.m. or less, is of a doubtful type. If no oedema is seen, though some redness is present, the test is negative.

The test is of great importance in the diagnosis of lesions in the children, especially of great value in mass surveys and contact examination, where it can be safely employed to reduce the expense of unnecessary radiological examinations, only cases positive to this test being taken up for further investigation by X-ray.

The clinical interpretation of the test with our present statistical knowledge goes to prove that a negative test is all important, especially in children between 2 to 5 years of age, as excluding infection by the tubercle bacillus, negating the possibility of any clinical signs in the lungs, due to such infection. But as the age advances, a positive test is not of much significance, especially in an urban population. The test if negative, even with a dilution of 1/100 old tuberculin or the 2nd dose of P.P.D., excludes the possibility of tuberculous infection in 96% of the cases. In only a few cases, those that are in the anti-allergic period, in very advanced miliary or generalised tuberculosis, or moribund cases of tubercle, or those suffering from acute infective diseases like measles, scarlet fever, chicken-pox, diphtheria, whooping cough, is a negative test present.

As regards a positive reaction in children MYER's advice that "the tuberculin test which results in a positive reaction indicates that tubercle bacilli have gained entrance, found lodgment and are producing or have produced tubercles and should be followed by immediate treatment" is the safest to follow and carry out if the interests of the family and community at large are to be taken into account. The stronger the reaction to the high dilutions the greater are the chances of the lesion being a progressive or active one, unless other evidence. (from X-rays and search for tubercle bacilli and blood pictures) proves the contrary. Thus we see that this test by itself gives a definite idea of the tuberculous nature of a lesion clinically established and in the case of contacts, or in mass surveys, enables us to select those cases where there is definite infection with the tubercle bacillus. thus sorting out those on whom further investigation with a view to treatment can be carried out.

Coming now to the value of blood examination, though this does not give us any specific diagnostic lead, it helps considerably in confirming it and gives valuable assistance in forming an idea regarding (1) the patient's resistance to the disease and (2) the response of his metabolic processes to the various chemotherapeutic procedures adopted and (3) prognosis. Among the blood tests, in the order of their importance, we can arrange them as:—

- (1) The sedimentation rate of the R.B.C.
- (2) Blood counts of W.B.C.—both total and differential.
- (3) Serological tests like the complement fixation test.

The Sedimentation Rate of R.B.C.:—There are several methods of performing this test as adopted by several workers. One group of workers, headed by WESTERGREN, measure the height of the column of free fluid after the cells have settled down, another group of workers measure the height of the red cell column itself. Difference in technique leads to confusion in the comparison of various figures, unless the actual method by which the test was done is reported. Originally introduced by FAHRACUS in 1918, and modified by WESTERGREN, the method consists in drawing blood from a vein upto to the 2 c.c. mark into a syringe containing 0.4 c.c. of 3.8% Sodium Citrate solution. This is mixed well and placed in a small sized test tube. From this, the blood is drawn into a special tube of 2.5 m.m. in diameter up to a height of 200 m.m. marked on the 30. c.m long tube. These tubes are fixed on a special stand so that the tip of the tube is pressed against a small rubber base and held up vertically by a spring devise at the top. The height of the fluid column above the R.B.C. level is read at the end of 1 hour and 2 hours and 24 hours. The usual reading of the 1st and $\frac{1}{2}$ of the reading of the 2nd hour is added and this divided by 2 gives the average sedimentation rate. In normal adult men in South India, it ranges from 8 to 12 m.m. and in women from 10 to 15 m.m. The higher the figure the greater are the chances of active disease being present. There is no diagnostic significance about this test. When once a diagnosis is established and the test is repeated

fortnightly, any increase in the rate means a rapid increase of the disease, increased cell destruction in the diseased lung.

Similarly, in cases which are improving, the rate usually falls and returns to normal in arrested cases. Very often, impending pleural effusion or any exacerbation of disease can be foretold in these cases by the increase in sedimentation rate, days before the actual onset of the trouble.

Similarly, the response to good treatment can also be judged. When the S. R. is done the same evening or within 24 hours after an initial dose of gold injection, the rate is found to be reduced in cases which are likely to be benefited by this line of treatment and in those which are not likely to improve, the rate is more than before if not the same. Records all over the world go to prove that this test by itself can be used as an accurate guide to the activity of the lesion even better than the pulse rate, the temperature chart and weight records of the pulmonary tuberculosis patients and is even better than the "exercise" test to give ultimate prognosis.

Apart from the sedimentation rate, the blood picture has been studied by various workers. Here also it is essential to form a clinical diagnosis before any importance is attached to the blood picture as the condition of the blood is not diagnostic. The R. B. C. and hæmoglobin values are not of any practical importance. It is the leucocyte picture that is of great value in assessing the condition of the patient, the resistance he is putting up. ARNETH in 1904 started this study by his 'count' of the different number of lobes in the nucleus of the neutrophile leucocyte. Other workers, notably SABIN, MEDLAR, FLIN and several others, have added to this literature. MEDLAR attributes different roles to the different types of leucocytes. The neutrophile is preponderant in cases of tuberculous ulceration and cavity formation and any breaking down conditions or extension of the disease. The lymphocyte dominates the picture when healing is in progress and the monocytes increase in new tubercle formations. Very great importance is to be given to the lymphocyte monocyte ratio in the prognosis of a case. The monocyte increase, however, is to be taken as evidence of hyperplasia or new tubercle formation only in cases where the lymphocytes have come down in number and the polymorphs are on the increase with a rising total W. B. C. count. For, when the lymphocytes are normal in number, and the total W. B. C. count is below 8000 as is seen when healing processes start, the monocytes are found to have increased, though the picture is no longer one of hyperplasia.

MEDLAR has established certain normals. The total W.B.C. range is between 6000 to 9000, the polynuclears: 50 to 64%, lymphocytes: 25 to 39%, monocytes: 6 to 9% and eosinophils—1 to 3%, basophils—0.5 to 1%. The patients are placed in groups depending on the type of leucocyte picture they present: the septic, the hyperplastic and the resistant.

	Total. White cells.	Poly- morphs.	Lympho- cytes.	Mono- cytes.	
Septic	Increased over 10,000	55 to 70	Below 25%	Above 9%	Indicating abscess formation or extension of disease.
Hyper- plastic	About 8 to 10,000	below 65%	Above 25%	10% or Above	Progressive spread with tubercle formation, but no caseation, if L are high the healing is obser- ved.
Resis- tant	5 to 8 thou- sand not over 10,000	About 55 % to 60%	Closely ap- proximat- ing the po- lymorphs	Less than 10%	Good resistance and healing type of lesions.

WISEMAN differentiates the lymphocytes according to their age and maturity into 5% young basophilic types, 45% mature moderately basophilic forms, 50% old faintly basophilic lymphocytes. If the young and immature forms are increased, it denotes an additional strain on the lymphatic tissues. Though there is an increase in the lymphocytes and the lymphocyte monocyte ratio is normal or more in favour of the lymphocytes, he has established that unless the percentage increase of lymphocytes is of the mature forms, the relative increase is not favourable to the patient's prognosis.

Other studies include the Von Bonsdorf count, where the total number of separate nuclei in the first 100 polymorphonuclears counted give the same indication as the Arneth's count shift to the left or right. The higher the figures the better the prognosis, a figure of 270 or over is seen in healthy normals. Then comes the Schilling Hæmogram, where the juvenile forms or the stabkernige cells attain importance in that as the number increases the prognosis becomes graver.

Of late, several workers have combined the blood counts, sedimentation rate etc., into what they call "Index" figures. According to the figures obtained, the prognosis varies and cases fall into favourable and unfavourable classes.

"Houghton, among other workers on the Index figures, formulates the theory that the differential count indicates potential resistance to the disease, while the S. R. and Von Bonsdorf count reflect the condition which is the result of the lesion, the former indicating the amount of constitutional disturbance and consequent state of metabolism, and the latter, the toxæmia which is the result of the activity. His "Hæmogram" or "Index" serves not only as a basis of convenient comparison between cases but also as a fairly accurate guiding scale, of the pathological status of the patient at any given point in his treatment" (TRAIL 1937).

HOUGHTON'S index formation is $B - (S. R. + [P + M - 2 L.E.]) = \text{Index}$, where B is the Von Bonsdorf count, S. R. the sedimentation rate, P. number of polymorphs, M. the mononuclears, L. lymphocytes and E.

eosinophils, and an index of over 260 is about normal. Lower figures are of bad prognosis.

According to his findings, the patients undergoing treatment fall under two groups according to an initial dose of Sanocrysin (0.1 or 0.25 grms).

	GROUP A.	GROUP B.
Total leucocytes ...	Increased	Decreased
Total lymphocytes ...	Increased	Decreased
Total monocytes ...	Decreased or very slightly increased	Greatly increased
Sedimentation Rate ...	Decreased	Increased

Cases which would benefit by further gold injections would fall into group A, and those that failed to improve always fell into group B.

FRIMODT MOLLER and BARTON (Tubercle 1933-14-529) have combined the sedimentation rate and the Schilling count to give an index, an increase in which points to a spreading lesion and is less favourable to the patient; the greater the increase the worse the prognosis. Their "Index" is $N + \left(\frac{st}{N} \times 100\right) + M + \frac{SR}{2} - 2L$ where N. is the number of polynuclears, St.—the number of stabkernige cells; M—number of mononuclears; S. R.—the sedimentation rate in millimeters in a column of 200 m.m. after 1 hour and L.—lymphocytes.

BREDECK utilises the tuberculin injections and Schilling blood count taken before and after the injections in diagnosis. The tuberculin induces focal activity, and after the injection of 3 to 10 milligram of tuberculin, if the case is one of tubercle, the characteristic change in the blood picture—a decrease of lymphocytes, a marked increase in the stabkernige cells and an increase in the mononuclears—will be in evidence. These changes in the blood count are brought on by small doses of tuberculin which do not produce fever and the change is apparent before any general reaction takes place if at all. Thus, this test of subcutaneous injection of tuberculin and performing a Schilling count before and after the injection, which DR. BENJAMIN and BARTON of Madanapalle also advocate, if done properly, with all due care to the technic, constitutes our most delicate and most accurate method in the diagnosis of early manifestations in those pre-clinical cases, where a diagnosis is essential from the family and the social points of view.

Regarding the other tests like the complement fixation test etc., as they are of no practical value other than in confirming an established diagnosis, interest is fast waning from these.

In conclusion, when a case of pulmonary tuberculosis in its pre-clinical stage presents itself, all help from the laboratory tests like the subcutaneous injection of tuberculin and performance of Schilling counts before and after, or at least the Mantoux test and blood counts should be adopted to arrive at a diagnosis in addition to the usual clinical and X-ray examinations. After a diagnosis is arrived at, the pathological condition in the lungs should be determined by the

sedimentation rate and Schilling counts and frequent records of these tests should be maintained to compare the progress or otherwise due to the various forms of treatment given to the patient. It is seen that the help of the laboratory is indispensable to the clinician in the diagnosis, prognosis, and treatment of pulmonary tuberculosis in all stages.

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Salient Hints About Differential Diagnosis in Pulmonary Tuberculosis

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DOCTORS are obliged to consider a large number of pulmonary and other diseases as regards the differential diagnosis due to the multiplicity of appearances in lung tuberculosis and the varieties of its possible complications.

We know that lung tuberculosis may be unilateral or bilateral, acute or chronic, painless or painful, afebrile, sub-febrile, continuously febrile or intermittently febrile, with or without cough, with or without expectoration, with or without hæmoptysis etc. One or more of these manifold appearances of lung tuberculosis may show similarity of symptoms to those of other diseases which may be divided into two groups; 1st. Non-pulmonary diseases, 2nd. Pulmonary diseases.

Non-pulmonary Diseases.—These are due to changes in general metabolism of the system *e. g.* thyrotoxicosis, diabetes, neurosis of the autonomic nervous system and tuberculosis of other organs such as urogenital tuberculosis, Addison's Disease, latent bone and joint-tuberculosis and, last but not the least, latent carcinomata. Whenever we encounter with bad general resistance or lowered vitality for recuperation, we have to think about these manifold diseases. Differential diagnosis in this group of diseases is, however, relatively easy as X-ray examination will reveal whether pulmonary tuberculosis is present or not.

Pulmonary Diseases.—I. Tuberculosis simulating Non-tuberculous Diseases.—In great many pulmonary diseases, presence of tubercle bacilli reveals the tuberculous affection of the lung. On the other hand, absence of tubercle bacilli does not at all exclude pulmonary tuberculosis. It goes without saying that negative sputum means that the smear, concentration method, the culture and the animal inoculation are all negative. In infancy and childhood, the examination of gastric contents and material from gastric lavage also must not be forgotten. On the average even with negative sputum, the probability of encountering tuberculous affection of lungs is still greater than the presence of other diseases. These forms of affections are called "closed" pulmonary tuberculosis. Clinical forms of closed type are such cases with early more or less active lesions which are described as "early infiltration" or Assmann Focus. Radiologically, they appear as soft diffuse haziness, sometimes circular, preferably in the infra-clavicular region. At times, these early infiltrations may also

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appear as soft circumscribed mottling. Clinically, these cases present rather constitutional than catarrhal symptoms.

Another group of mostly closed variety is generalised or localised miliary tuberculosis, radiologically quite distinct as minute uniform spots often described as sago-like appearance. Clinically, in these cases, practically nothing can be detected on auscultation or percussion.

Next group comprises of mostly chronic quiescent lesions of fibrotic appearance on X-ray and clinically with or without catarrhal symptoms.

Again, there is a group of cases with hæmoptysis showing negative sputum for a long time. It much depends upon the character of sputum when examined. It may be purulent or mucoid; repeated negative reports from purulent sputum are valid evidence against the diagnosis of pulmonary tuberculosis, while same from mucoid sputum have less diagnostic significance.

Absence of tubercle bacilli may occur still in other group of cases with radiological and clinical evidence of any type of tuberculosis due to faulty technic of expectoration on the part of the patient, at times, with some purpose. These *virtually open* cases form a social group rather than a clinical one and are highly important in the preventive section of anti-tuberculosis campaign.

Apart from sputum examination, it is necessary to have a detailed previous personal history including patient's professional and social conditions and family history. This may help the doctor to get some information about the possible hereditary disposition to tuberculosis, malignant growth or blood diseases. Further information may be obtained about exposure to dust, (pneumoconiosis), animal or vegetable parasites (echinococcus, pneumomycosis) or to syphilitic infection. All these data are very important as the clinical aspect would give more or less similarity of symptoms which make differential diagnosis difficult.

II. Non-tuberculous Diseases simulating Tuberculosis.—Examination by auscultation and percussion may reveal only consolidation or catarrhal condition of the lung tissue, but it would not help at all to detect the nature of lesion as X-ray examination would do. Hence, our further description will be guided predominantly by roentgenological aspect which is the main factor in our differential diagnosis of lung affections.

Some of the most important appearances are transient (rapidly disappearing) or persistent circular lesions frequently observed and described in recent times. Depending upon the fact discovered by ASSMANN and REDECKER about early tuberculous infiltration in adults and about secondary perifocal infiltration in children (ELIASBERG), if such circular shadows are visible, the suspicion of tuberculous origin is to be considered first.

Again, such shadows may be due to non-specific broncho-pneumonic

condition of the lung tissue especially in cases with rapid disappearance. Individual cases of various types are very difficult to diagnose definitely in the beginning but progressing roentgenological manifestation would give the missing points to complete the clinical aspect.

Typical lobar pneumonias and broncho-pneumonias are not difficult to diagnose but atypical and chronic forms are liable to mislead the doctors because they present similarity of symptoms to those of lung tuberculosis.

Recently, SCADDING has described 4 types of such pneumonias which he divides as follows: (1) Sequelæ of acute pneumococcal pneumonia. (2) Benign circumscribed variety. (3) Chronic pneumonias. (4) Pneumonias in scattered foci.

As regards the first group, two main aspects have to be observed: (a) Formation of non-putrid bronchiectasis in resolving areas. (b) Rarer form of sequelæ is organisation which appears radiologically as slowly progressing fibrosis.

In these types, the history of the illness and its course would give the discriminating clue to the correct diagnosis.

The second group, which other authors call pneumonitis, has great similarity to catarrhal onset of lung tuberculosis. Its course is similar to the above mentioned transient type of circular shadows with roentgenological difference of larger, less definitely limited haziness; i.e. more quantitative than qualitative difference, and this is the reason why other authors have classified this group as circular type.

The third group of chronic pneumonias comprises of forms with inflammatory consolidations in any one region of the lung tissue. They are characterised by delayed dissolution ending in abscess-like cavity formation or more or less extensive persistent fibrosis. It is impossible to discriminate these cases clinically or radiologically from lung tuberculosis until and unless the continuous absence of tubercle bacilli in the sputum may suggest non-specific lesion. Only necropsy would reveal the decisive diagnosis of these fortunately rare cases.

The last variety of pneumonias in scattered foci resembles the broncho-pneumonias. These foci reveal radiologically different aspects of progress in their various lesions in the same lung, e.g. resolution, cavitation or fibrosis. Generally, there is paucity of catarrhal symptoms and hence the definite diagnosis may give the same difficulty as in the former group.

Bronchitis.—When we speak about bronchitis, many medical men may doubt whether at all this disease gives any radiological evidence. In ordinary acute bronchitis, no doubt, there is hardly any. In chronic bronchitis and specially in bronchitis due to passive congestion from heart disease, there may be some roentgenological signs, e.g. increased trunk shadows and more or less accentuated arborisation. These features may easily be mistaken for tuberculous lesions. Clinically, the diagnosis may become easier by occasional detection of the so-called heart-failure cells in the sputum. In some cases of fibrinous

bronchitis, the hilum shadows may increase to such a density that they may lead to the suggestion of a neoplasm. Other cases of *bronchiolitis fibrosa obliterans* may give features of disseminated numerous small nodules in X-ray, presenting marked resemblance to miliary tuberculosis.

Asthma.—Similar X-ray signs as chronic bronchitis may occur in bronchial asthma, because it generally goes hand in hand with bronchitis. General outcome of bronchial asthma is secondary emphysema of the lung. Roentgenologically, it presents very clear and transparent field of the lung picture with large intercostal spaces and low flattened dome of the diaphragm. Same aspect may be seen in senile emphysema as well as in emphysema due to thoracic deformity. The differentiation against tuberculosis may be made out by negative sputum, characteristic signs and symptoms e.g., asthmatic fits, clubbed fingers, increased eosinophils in blood and sometimes even in sputum.

Bronchiectasis.—This is more or less again similar to chronic bronchitis and asthma in features. Since long, it was believed that bronchiectasis was rather a rare disease, localised in lower lobes, with great amount of fetid expectoration and at times hæmoptysis. X-ray era has revealed that it is of frequent occurrence and it is detected by bronchography i.e., X-ray picture after injection of Lipiodol in the bronchial tract. Principally, we differentiate between congenital forms and acquired ones. The congenital forms are indeed rather rare and quite easily to be detected without bronchography, as they appear as more or less large cysts occupying sometimes a very big area. These quite large and thin walled annular shadows should not be mistaken for tuberculous cavities. Without going into details regarding the intrinsic or extrinsic reasons of their origin, the acquired bronchiectasis is in a majority of cases, situated in the lower lobes; special technic of bronchography has, however, revealed that fairly greater numbers of bronchiectasis have been found even in upper lobes. The characteristic features by bronchography are: Dilatation of the bronchial branches ending in cylindrical or sacculated shapes. One kind of acquired bronchiectasis is a special form of tuberculous bronchiectasis, frequently developing in old fibrotic forms of lung tuberculosis. Careful sputum examination must be carried out whenever this variety is suspected.

Pulmonary Cysts.—Annular shadows, which are mistaken for bronchiectasis or tuberculous cavities, may be produced by cyst formations in lung tissue. The most important of these are congenital cysts and echinococcal or hydatid cysts. Congenital cysts may appear either as a solitary cavity occupying sometimes the size of the whole lobe similar to well known giant tuberculous cavities or as multiple smaller or larger cysts resembling bronchiectasis. In X-ray, it is described as honey-combed or grape cluster-like shadows. In children, diagnosis may be easier as tuberculous cavities of such a feature are uncommon; but these cavities may persist into adult life and hence the possibility of mistaken diagnosis. The hydatid disease may be found as a single cyst or multiple cysts of various sizes mostly

situated in the right base. This fact is of great importance as it is otherwise most apt to be confused with tuberculous cavity. They may appear at times also as dense opaque shadows being full of liquid, and so sometimes they are suspected as tumors. When there is perforation in the bronchus, there is chance for finding hooks in the sputum. This is the definite sign for correct diagnosis. Blood picture of such a patient would show marked eosinophilia. Serum reaction (complement fixation test) is a very valuable guide.

In the above description, we have dealt with the diseases which are radiologically evident mostly in the lung area. Now, we come to the diseases which may be considered as a separate group because their beginning and progress are connected more or less with the hilum. They are lung syphilis, pneumoconiosis and tumors. Early differential diagnosis among this group and against tuberculous affection of the hilum is very difficult because the common features of all these affections are radiologically enlargement of hilum shadows with increased density and more or less marked accentuation of the hilar arborisation. The entire condition becomes more complicated as we know by experience that these diseases may be also combined with tuberculosis. Clinically, many common symptoms may appear simultaneously and obscure the correct diagnosis. There may be irritative or static bronchitis due to some compression, irritative cough due to pressure on the vagus, slight hæmoptysis and paresis of the vocal cords due to pressure on the recurrent laryngeal nerve. As the lesion progresses, every disease may acquire more distinct features.

Syphilis of the Lung.—To diagnose this disease clinically or roentgenologically is almost impossible. Pathologically, it is divided into 3 groups, viz. congenital, interstitial and gummata. Congenital group has only pathological importance. The acquired syphilis may show the above mentioned increased hilum shadows with accentuation of the arborisation, sometimes accompanied by marked fibrosis of lung parenchyma. This feature is believed to be due to interstitial syphilitic lesion. The gummata appear in isolated or multiple infiltrations. Neither of these forms shows any characteristic signs which may be useful for differential diagnosis. Of course, the serum reaction, the previous history and the presence of other syphilitic symptoms, such as syphilitic laryngitis, mesaortitis etc. are carefully to be examined. So, the diagnosis has to be established by exclusion. There is on the other hand, good chance of clearing the field for diagnosis by therapeutic attempt because the syphilitic lung lesions respond favourably to the specific treatment. However, there are some cases which cannot be influenced even by this treatment as well as other non-specific diseases which are very arseno-sensitive e. g. the fusospirillary symbiosis.

Pneumoconiosis.—This has been dealt with and described so frequently in recent times that we only touch the main points of this particular group. Its importance consists chiefly in combining with tuberculosis more than all other lung diseases. We may be allowed to consider it as creating tuberculous disposition. As long as it is

no tuberculosis engrafted on pneumoconiosis, which happens generally in advanced pneumoconiotic lung, we find predominantly indurating inflammatory reactions due to extremely fine particles of dust inhaled through respiratory tract. The most important irritative matter is silica, hence the disease is called silicosis instead of pneumoconiosis. Again, there may be coal dust, clay dust or iron dust as irritative factors for which we find various names, e. g. anthracosis, chalicosis, siderosis. They all show similar physical and radiological aspects with one exception namely asbestosis due to asbestos about which we shall refer later. We can rely very little on clinical signs. Although X-ray shows fairly widespread involvement of the lung tissue, the absence of catarrhal symptoms is a characteristic feature in this affection; this may be changed only after superimposed tuberculous infection. In contrast to this lack of clinical symptoms, X-ray findings are much more evident. Whenever we are going to differentiate the stages of pneumoconiosis, we have to rely entirely on X-ray examination. First stage is characterised by enlargement of hilum shadows with sweepstick-shaped accentuation, specially towards the base, frequently with pleuritic irregularity of the diaphragm. Second stage shows more or less uniformly arranged mottling in the lung substance (most characteristic) frequently called snow flakes feature intermingled with fibrotic striæ. In the third stage, fibrosis becomes more and more increased involving large parts of the lung fields with dense and coarse indurative and atelectatic patches which acquire sometimes tumor like appearance. The degree of density may become bone-like and take sometimes characteristic shell-like features. Displacement of mediastinum and heart is quite common due to fibrotic retraction. In this stage, generally tuberculous lesion has already invaded the lungs so that we may come across cavities and tuberculous lesions which altogether may even overcome the former pneumoconiotic conditions. Noteworthy exception to the above description of pneumoconiosis is asbestosis, discovered very recently, in workers exposed to asbestos dust. The lung affected by this offender shows fine mottled diffuse haziness situated almost without exception in the lower lobes.

Tumors of the Lungs.—The most common and most important tumor is cancer which originates mostly from the bronchial epithelium, if it is a primary one and less frequently from bronchial glands or alveolar epithelium if it is due to metastasis. The initial symptoms in X-ray may become evident by the appearance of increased and densified hilum shadow (generally unilateral) with finger-like processes. In progressive stages, we observe extensive, massive opacities due to large atelectasis from bronchial compression. Many times we find simultaneously quite distinct multiple metastatic shadows. Central softening of cancerous foci may simulate tuberculous cavities. As a special feature, we have to mention miliary carcinomatosis, which may appear similar to miliary tuberculosis. For some time radiologically and clinically, the decisive diagnosis may be difficult. After short duration, the X-ray appearance becomes quite characteristic and at the

same time general clinical symptoms would become more evident as well, *e.g.* cachexia, hæmoptysis, currant jelly expectoration, very high blood sedimentation in disproportion to almost normal blood picture.

Next to cancer, most frequent is Hodgkin's Disease. Its radiological appearance would at once give the suspicion of a tumor because of its homogeneous growth from mediastinum shadows accompanied mostly by enlargement of cervical, axillary and other glands. In the beginning the differentiation may be difficult against tuberculous tracheo-bronchial adenitis, but, as the disease progresses, the feature of malignancy becomes soon evident.

Still, there are other thoracic diseases, *e.g.* abscess, gangrene of the lung, empyema, pleuritic affections, anomalies of thyroid and thymus which give however clinically such marked and well-defined symptoms that confusion with lung tuberculosis would hardly be possible. And hence, we do not describe those manifold lesions unnecessarily.

Again, there are some benign tumors which may involve the lung tissue as they progress from bronchus, mediastinum, chest wall etc., but their clinical and roentgenological appearances are so markedly different from lung tuberculosis that, whatever doubt there may be about their structure and origin individually, they can hardly be mistaken as lung tuberculosis.

Conclusion.—Clinical examination may reveal alterations of the normal condition of the lung tissue as regards consolidation, emphysema etc., it may reveal also the presence of catarrhal condition; to a certain degree, it may give us even some signs of the extent of a lesion but with less reliability.

With unrivalled superiority, X-ray examination overcomes most of the remaining uncertainties. The location of any lesion can be ascertained with almost uncontestable security. Moreover, we are capable of discriminating fibrotic conditions from diffuse infiltrations. In a way, it gives a living counterfeit of the anatomo-pathological conditions and their progress proved so invaluable in the qualitative diagnosis of lung tuberculosis. Again, it gives indispensable help in discriminating differential features of other lung diseases simulating pulmonary tuberculosis. Relying on our practical experience in the X-ray department of our hospitals, we can say with emphasis that improvements of radiological technic, *e.g.* stereoscopic radiography, tomography etc., go a great way in bringing the differential diagnosis to ever increasing exactness.

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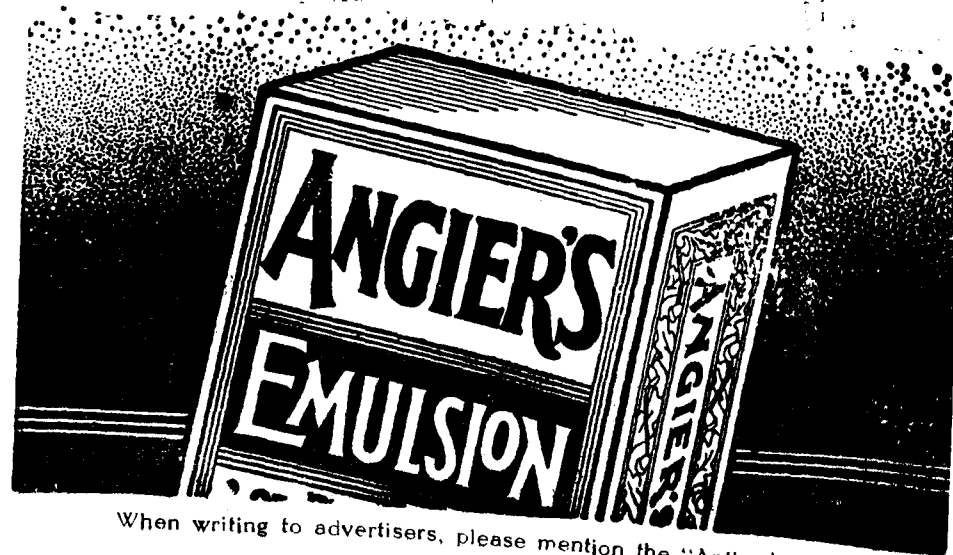
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Clinical Observations on the Aetiology of Hæmoptysis

BY

S. R. Rajaram M.B., B.S.

The Salem Clinic, Salem.

NATURE hoists a red flag in a case of hæmoptysis to warn the human mechanism that it needs rest and that all strain, whether physical or mental, should be put an end to. Be it in pulmonary tuberculosis or in mitral stenosis or in any of the other numerous causes for hæmoptysis, the awe-inspiring sign of blood is an alarming call for rest.

Definition.—Hæmoptysis strictly means spitting of blood from hæmorrhage below the vocal cords. Ordinarily, hæmoptysis has come to be classified as spurious and true. Spurious, we shall dispose off by saying that the bleeding comes from above the larynx *i.e.* hæmorrhage from the gums, pharyngeal varices, or nasal mucous membrane. Among the aetiological factors for true hæmoptysis, we have the common causes such as T. P., mitral stenosis, either due to a pulmonary infarct or as a result of chronic venous congestion. The other causes are pneumonias, here we include the chronic pneumonia of J. G. SCADDING, broncho-pneumonia, and bronchiectasis. Less frequently, new growths like adenoma and carcinoma, abscess or gangrene, cause hæmoptysis. Still rarer aetiological factors are: actinomycosis, hydatid infection, and pneumoconiosis. Traumatic causes due to penetrating wounds of the chest, as in fracture of the rib or foreign body, are sometimes met with. The hæmorrhagic diathesis in blood diseases like the primary anæmias, leukanæmia, purpura, and hæmophilia show no partiality to the lungs in bringing about hæmorrhage. Deficiency diseases like scurvy, hæmorrhagic forms of small-pox, and measles should also be remembered as rare aetiological factors. Very rarely, cases of hæmoptysis are met with, associated with high blood pressure and arteriosclerosis or an aneurysm eroding into a main bronchus or the trachea. Rarer still, a pneumolith in the lung, (hæmoptysis calcuosa) or a caseous tuberculous gland set up a hæmorrhage by erosion. The above list may be taken as fairly complete if we include spirochætal bronchitis, aspergilosis and paragonomiasis of the lungs.

As regards the clinical observations in the aetiology of hæmoptysis, it is the experience of every member of the profession to come across cases of hæmoptysis in T.P. Here, we get it in three stages of the disease *i.e.* due to a congestive process around the early tubercular lesions, from the ulceration of a small vessel; or by the bursting of an aneurysm in a tubercular cavity. In the former two conditions, hæmoptysis is a blessing in disguise, since the patient is alarmed and rushes for medical aid, and thus has the benefit of early treatment, unlike those who run a low temperature or an intermittent cough or a loss of appetite and slow emaciation or any of the other numerous early

signs of T. P. From clinical observations of hæmoptysis in T. P., one is surprised at the great quantities of blood that patients lose as in a cavity and the rapid recovery that these patients make with efficient treatment. Mitral stenosis is the next commonest cause of hæmoptysis. Clinical observations of R. A. YOUNG and G. E. BEAUMONT show that T. P. and mitral stenosis account for the majority of cases of hæmoptysis.

CASE 1. Mr. P. aged 42 years, admitted on 10-4-40 for cardiac failure—right-sided. Previous History:—Had suffered from rheumatic fever in his 18 th year. For the past 3 years, dyspnoea on exertion. Nine months back, he had profuse hæmoptysis which repeated itself the next day, and for a fortnight after, he was coughing up blood, tinged sputum. On examination, presystolic thrill, presystolic and systolic murmur heard in the mitral area. Systolic murmur conducted well into the axilla up to the mid-axillary line. X-ray revealed a right-sided enlarged heart. With the usual treatment, he fairly got over the crisis, and was discharged on 14-5-40. He went back to his native place and there died two months later of right-sided cardiac failure.

CASE 2. A poor Athi-Dravida boy, 13 yrs. old, developed acute glomerulo-tubular nephritis, one year and five months back. He got over the attack but was again swollen up with chronic nephritis six months back; this time, the heart showing an early mitral lesion. This attack also he got over. Again, he came under our care on 12-5-40 with anasarca, his heart showing a well marked double mitral lesion. On 25-6-40, he had slight hæmoptysis due to chronic venous congestion. In a way, the patient has tided over his nephritic attack, but is a chronic invalid in bed with a crippled heart.

Among the less common ætiological factors of hæmoptysis, are malignant disease of the lungs. An English man, middle aged, was admitted in one of the hospitals in Madras for spitting blood-tinged sputum "prune juice type" of two months' duration. Temperature varying from 98.4 to 99.6 in the evening. Slight dyspnoea on exertion and irritant cough of five months' duration. X-ray showed an irregularly spreading shadow in the right upper lobe. Microscopic examination of sputum showed fat cells and irregular epithelial cells with large, rounded nucleus of varying size. As nothing more than expectant treatment could be done, patient got himself discharged.

Hæmoptysis due to Trauma:—A case was admitted in our clinic on 10-7-39 of a Mahomedan, aged 38 yrs. He had a fall from the top of a bus and was coughing up pellets of fresh blood. Clinical examination showed fracture of the 8th and 9th ribs as also fracture of the lower third of ulna. The usual strapping for the chest and plaster casing for the forearm were done. The spitting of blood continued for four days following when it disappeared gradually and the patient made an uneventful recovery. While hæmoptysis may be met with in some of the cases of bronchiectasis, the hæmoptysis occurring in cases of dry bronchiectasis (forme hemoptoique seche) is a rather rare condition.

This forme hemoptoique seche is a condition where there are periodical unexplained rises in temperature or a recurring hæmoptysis, without any other symptoms. I had the fortune to see one in the General Hospital, Madras, which, for want of details at present, I refrain from publishing. I am having another case here under my observation of a gentleman 52 yrs. of age, of very active habits. He has had his first attack of hæmoptysis in 1923, and subsequent attacks in 1924, 27, 30, 38, and June 1940. Sometimes, he has had half to one ounce of blood and at others streaks of blood in the sputum. He has gone round most of the tuberculosis specialists in this Presidency, who would not take him into their fold, after all the necessary investigations of X-ray, sputum examination, blood pressure etc. This we are inclined to take as one of dry bronchiectasis. But, for want of a thorough investigation, due to the fact that the patient does not find time, being a busy public man, we regret that we are not in possession of all the required data to prove our diagnosis as yet. As mentioned at the very outset, high blood pressure is indeed a very rare cause of hæmoptysis, it is akin to epistaxis, where there is bleeding from the nasal mucous membrane, or hæmorrhoids, where there is bleeding to relieve the portal congestion—these seem to be nature's safety valves. The following two cases are classified under this heading, as they do not fit in so well with any of the other ætiological factors for hæmoptysis, and still do not seem to be "Idiopathic"

CASE 1. A full-blooded Pathan, aged 34, hale and healthy, went out shopping in his car when, all of a sudden, he began to cough up 5 to 10 ounces of fresh blood and he rushed into the nursing home. He was promptly put to bed and the usual Calcium and hæmostatics as well as one sixth grain of Morphia were given. If I may be allowed to digress, Morphia is advocated by one school and condemned by another, in this condition. RIVIERE, discussing this question in great detail, concludes that the prognosis in any individual case of hæmoptysis is "on the knees of the Gods" and that "nature's method will here be plugging of the area around with blood clot—until, soon, her concern for clear air tubes leads her to defeat these efforts by the induction of cough. How clear a passage can be steered under such circumstances—between the Scylla of infarcted lung with its threat of pneumonia or subsequent tuberculosis, and the Charybdis of continuing hæmorrhage—is for the physician to ponder; for, he holds the fatal rudder, Opium and its derivatives, in his hands". But we agree more with L. S. T. BURRELL, when he says that hæmoptysis is only rarely fatal and Morphia will not save such patients. Whereas in most of the other cases where a little calming of the patient is required, a small initial dose of Morphia is indeed good, as this would not suppress the cough reflex, which is said to act like a watch dog, preventing accumulation of blood in the tubes any more than natural sleep does; on the other hand, it does undoubtedly pacify the patient. To continue, after about three hours he coughed up again three ounces of blood and the next day again about 3 oz. of blood, and for a week after that, his sputum was blood-tinged. Clinical findings: Temp. 98.3; Pulse, slightly

rapid whenever there was loss of blood, of high tension and good volume. B. P. taken on the second day read 182/105. Nil abnormal could be made out either from clinical examination or an X-ray photograph or a sputum examination. When the sputum was free from blood, the B. P. was 132/98. The patient was discharged after a fortnight, quite hale and healthy, and the grateful patient called in at the Clinic almost every third week for six months following and nothing pathological could be discovered except that B. P. showed a tendency to rise.

We make bold to cite yet another case of hæmoptysis under this heading with the greatest reserve. It is of a Muslim, aged 58 yrs., who was seen on 5-4-39 night for coughing up nearly 6 to 8 oz. of blood. There was visible pulsation of the brachial and temporal arteries. With the usual treatment, the hæmoptysis continued twice on 6-4-39, and once on the following three days, while the sputum was blood-stained for more than a week. B.P. taken on the 3rd day read 128/103, B. P. taken after a week, 90/70. The visible pulsation of the arteries disappeared and the patient felt much relieved and healthy for all the bleeding he had had. Again on 17-9-39, he called on us with the usual syndrome, but this time bringing up much less quantity of blood. B. P. 112/96 and after 5 days, when the hæmoptysis had stopped, B.P. was 96/66. Previous History: Two years back, patient had blood-tinged sputum for about four days, which subsided on its own accord. X-ray picture showed slight fibrosis in both the lungs. The case was presented before the Dt. Medical Association where great interest was evinced by the members. Even last week, the patient called in at the Clinic for a friendly chat, quite active and healthy.

In the absence of any other pathological lesion in any of the systems and in the absence of any such finding as a low pyrexia, cough with expectoration or weakness etc. and due to the fact that each time, the onset of hæmoptysis is preceded by visible pulsation of the arteries, and that the patient finds a relief after each bout of loss of blood and that the only variations in our findings, during and after an attack of hæmoptysis, are the disappearance of the visible pulsation and also a fall in the B. P. reading,—though the figures are absurdly low—we are reluctantly inclined to style the case as one due to a “relative rise in B.P. and at the same time, keep an open mind for further suggestions on the case.

Hysteria is an almost universal factor in the signs and symptoms of diseases and hæmoptysis is no exception to the rule. OSLER, in his book on Principles and Practice of Medicine, discusses in the chapter on Hysteria, how hæmoptysis can be one of the signs in this condition; the blood in this case coming from the gums with frothy sputum,—in fact spurious hæmoptysis. Recently, a case was seen of a lady who was said to be under the “possession of a devil” who was frothing her mouth with blood-tinged sputum which, on local examination, showed to be coming from the gums.

Thus, mysterious and protean are the ways of nature, where a single sign like hæmoptysis has such wide applications and still in no

two cases is it exactly alike. Observations such as these force us to confess with master minds like ISAAC NEWTON that we are still “playing on the sea shore...finding a smoother pebble or a prettier shell”, whilst the great Ocean of Truth lies around us.

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Chronic Tubercular Ulcer Of Throat

Secondary to Miliary Tuberculosis of Lungs without
Fever, Cough and Expectoration

BY

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Senior House Surgeon, Children's Ward,
The Carmichael Medical College Hospitals, Calcutta,

ASHU MANNA, a Hindoo boy of 12 years, was admitted in the Children's Ward of the Carmichael Medical College Hospitals, Calcutta, on the 16th January, 1940, with the following complaints:—

- | | |
|---|-------------|
| (1) Ulceration of the uvula, tonsils and the neighbouring structures. | } 4 months. |
| (2) Hoarseness of voice. | |
| (3) Temperature : 98.4°. axillary. | |

Onset :—The attendant of the patient says that about 4 months back, the boy was found to cry bitterly during meals, the more so, if it were peppered. A few days after, it was detected after a thorough search that there were a few nodules over the faucial arches. They burst, ulcerated, coalesced together and gradually extended all over the faucial arches (pillars of the fauces), tonsils, uvula and the neighbouring structures, giving rise to the present condition. Since the ulceration, the boy has developed hoarseness of his voice which is increasing from day to day. The ulcer is not at all responding to local application of paints and the usual anti-streptococcal remedies.

Past History :—Suffered from pneumonia 6 years back and from typhoid 5 years back; 1 year back, the boy had a swelling of the right sub-maxillary region.

Personal History :—Nothing of note.

Family History:—The mother of the boy has no history of abortion but the father has been suffering from mental disorder.

General Survey:—A boy of average build, lying supine with a slight depression of the nasal bridge. Pulse rate 128 per minute, regular; volume and tension—moderate; respiration, 24 per minute, regular. Temperature, 98.4° F. (axillary).

Local Examination including Laryngoscopy:—Ulceration of the pillars of the fauces, tonsils, uvula, soft palate, epiglottis, vocal cords etc. with unhealthy yellowish white slough. The ulcerated area feels hard, indurated and granular.

Neck Glands:—Discrete, some shotty, a few of rubbery consistency.

Respiratory System:—Hoarseness of voice. A few crepitations and rhonchi over both the lungs.

Nervous System:—Nothing abnormal.

Circulatory System:—Pulse rate 120–140 per minute; (this without any temperature is abnormally high for this age, under normal conditions); apex beat—5th interspace, just internal to the midclavicular line; cardiac area—normal; heart sounds—normal.

Alimentary System and Abdomen:—Tongue—pale, moist and partly coated on the dorsum; liver—palpable and firm; spleen—palpable and hard.

Others:—Nothing of note; epitrochlear glands—not palpable; inguinal glands—discrete and shotty.

Special Examinations:—1. Urine Exam. report—a trace of albumin present.

2. **Throat Swab:**—(a) Aerobic culture—No C. Diphtheriæ (on repeated cultures), Strepto viridans only; (b) Anaerobic culture—No gas forming organism, Streptococcus and Gram-negative bacillus, Vincent fusiform bacilli; (c) Scrapings from the throat on Dark Ground Illumination—No spirochaetes found; (d) Biopsy of the ulcer—Granulation tissue only; (e) No acid fast bacilli.

3. **Blood Exam. Report:**—Hb. 60%; Total count—R.B.C. 3.1 million; W.B.C. 5,000; Diff. count—Poly 61%; Lympho 36%; Eosin 1%; Mono 2%; No M.P. found.

4. **Sedimentation Rate:**—17 m.m. per hour (9-2-40); 51 m.m. per hour (9-4-40).

5. **Serum Tests:**—Aldehyde negative; Chopra, negative; W.R. Previous Exam. was negative; fairly positive (19-1-40); doubtful (21-3-40). Kahn, negative (19-1-40); Doubtful (21-3-40).

6. **Skiagram of the Chest:**—Miliary tubercular infiltrations throughout both lung fields.

7. **Eye Examination Report:**—Fundus oculi, normal—No choroidal tubercle.

Treatment.—In the early part—Pot. Iodide gr. ii p to gr. v thrice daily by mouth; intramuscular injections of Soamin gr. $\frac{1}{2}$, twice a week; gargle with electrolytic chlorine—twice daily; and inhalation of Tr. Benzoin Co., from steam kettle every morning. With these medications, the sloughs cleared up in about three weeks and the ulcer showed definite formation of healthy granulation tissue. The hoarseness of voice was but little improved.

In the next month—Bismostab $\frac{1}{2}$ c.c., intramuscular, twice a week; total dose 6 c.c. Soamin gr. $\frac{1}{2}$, alternately with Bismostab; total dose 8 $\frac{1}{2}$ grs. Lotio Hydrarg Perchlor, 1 in 10,000, for gargle; Pot. Iodide and Tr. Benzoin Co. continued.

Before discharge—In addition to the Pot. Iodide mixture, gargle and inhalation, 2% Sodium Antimony Tartrate was given intravenously, twice a week, beginning with $\frac{1}{2}$ c.c., increasing by the same dose and going upto 2 c.c. This was undertaken on the presumption of fungal infection but without any effect.

Diet:—All along, he was being given full rice diet in the morning, 'Chapati' (Wholemeal Bread) in the evening, with milk and eggs in between these meals.

In spite of all these, the improvement met with in the ulcer during the early part of the treatment did not progress any more. The general health of the patient was much improved and he gained 8 lbs. in weight (from 3 stones to 3 stones and 8 lbs).

Discussion.—The possibilities in this case are; (1) Tubercular ulcer; (2) syphilitic ulcer; (3) diphtheritic ulcer; (4) Vincent's angina; (5) Streptococcal ulcer; (6) mycetes or fungal infection; (7) malignant ulcer; (8) Duguet's ulcer.

1. **Tubercular Ulcer:**—The nature of the ulcer, infiltrations in both the lungs, enlargement of the neck glands, the persistent, rapid pulse, the sedimentation rate and negative therapeutic tests, are all in favour of the ulcer being tubercular in nature. But the peculiarity is that the temperature of the patient was all along between 98° F. and 98.4° F. during the three months of his stay in the hospital.

2. **Syphilitic Ulcer:**—The facies, duration of the disease, extensive ulceration and positive Wassermann Reaction suggest the lesion to be a syphilitic one. But, had it been a pure and simple syphilitic ulcer, the long continued treatment with Bismuth, arsenical preparation (Soamin) and Iodides would have completely melted it away. Neither could we demonstrate spirochaete by darkground illumination.

3. **Diphtheritic Ulcer:**—Had the case been one of diphtheritic ulcer of such long duration, without any specific treatment it would have involved the sixth cranial nerve by this time, and at least one of our culture reports would have been positive.

4. **Vincent's Angina:**—Is a form of stomatitis due to Vincent's Spirochaete and the Bacillus fusiformis. The ulcer in such case is

always painful and glands tender, but it is not so here, nor did the long-continued arsenical treatment and the local applications cure the case, as it should have done, had it been a case of Vincent's angina.

5. *Streptococcal Infection*:—As there is no acuteness of symptoms and both the cultural examination and the therapeutic test (with Prontosil group of drugs) were negative, such a possibility is remote.

6. *Mycoses or Fungal Infection*:—Is not quite common in this region and above all, we could not substantiate our suspicion by the examination of the scrapings, anaerobic culture or therapeutic test (by Iodides and 2% Sodium Antimony Tartrate).

7. *Malignant Ulcer*:—The long duration of the ulcer without involvement of any neighbouring structure and the biopsy remove this possibility from the mind. Also, this age is not quite common for malignancy.

8. *Duquet's Ulcer*:—Although there is a history of typhoid 5 years back, we don't think that it is at all possible for such an ulcer to be dormant and persistent for such a long time.

Scarlet Fever:—Is out of question here.

The case baffled all attempts at clinical diagnosis. The routine skiagraphy of the chest settled the true nature of the disease. It was afebrile throughout without cough and expectoration. But pulse rate was 124 in the resting position and respiration was 24. No cyanosis present. The smear of the throat and the slough did not show T. B.

The ulcer of the throat is, therefore, due to miliary tuberculosis of lungs both sides. As it was without fever, it was called *granule froide* by the French clinicians.

The slight improvement by antisyphilitic drugs may be due to remissions and relief of chronic ailment.

My grateful thanks are due to Dr. B. Shaha, M.B. (CAL.) D.T.M. & H. (LOND.), Visiting Physician and Associate Professor of Medicine, The Carmichael Medical College and Hospitals, Calcutta, for his encouragement and guidance in the study of the case and for his kind permission to publish this article.

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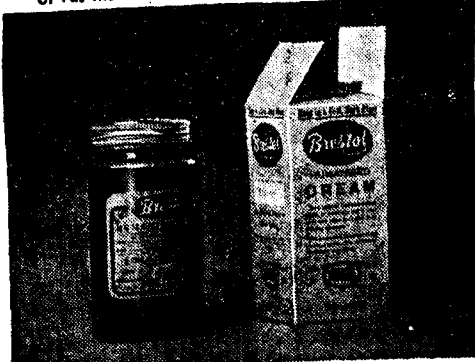
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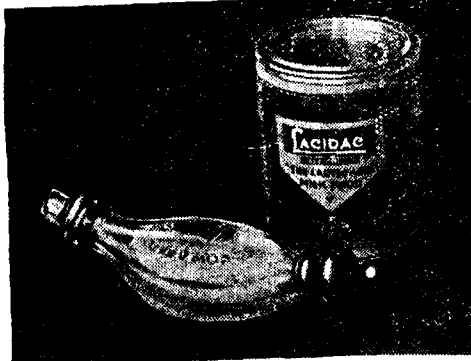
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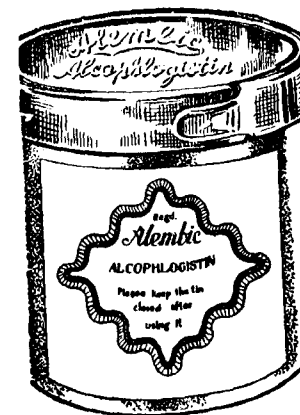
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Miliary Tuberculosis of Lungs

BY

B. D. Sindhvani, L.R.C.P. (LOND.), M.R.C.S. (ENG.),

Specialist, Chest Diseases, Peshawar, N. W. F. P.

ROUTINE, and now very frequent, radiography of the chest as an aid in diagnosis has brought into light miliary tuberculosis of lungs. In these days of X-ray facilities, no physician is justified to let a case of acute fever, go on indefinitely with a provisional diagnosis of typhoid or puerperal fever, without being X-rayed and ruled out as not being a case of acute miliary tuberculosis. Miliary tuberculosis, in its both acute and chronic forms, is so common on this side that we think a good many cases of typhoid and puerperal fever, are actually cases of miliary tuberculosis.

When infection of tuberculosis occurs, the results are of great variety and of all grades of intensity. The variety depends on the tissue affected and the route of spread of infection. The intensity depends on the degree of relative virulence shown by the tubercle bacillus and the amount of resistance shown by the patient. In miliary tuberculosis, the infection is so virulent and resistance so low that the illness brought on is of a most severe character.

The primary focus may lie:—(a) at the apex of a lung (b) in a bronchial gland and (c) at some distant spot in the body.

A focus thus may erode through a vein and invasion of blood stream by the tuberculous matter may occur which is essential for the miliary distribution. The resistance of the patient later determines the type of the disease; that is to say, if the person has never entertained a primary infection before and the virulence of the bacilli is great, the result is a tuberculosis of a general type (Galloping Phthisis).

Miliary tuberculosis of lungs may occur in an acute or a chronic form. An acute form may be limited to lungs only. Affection of the lungs may be a part of general miliary disease of the body, where peritoneum, all other organs, brain and meninges may be riddled with miliary tubercles. The acute type mostly bumps the patient off in a few weeks' time; but in some rare cases, it may become chronic and heal up, leaving very little evidence of the disease in lungs or only fibrosed patches which are revealed accidentally, when a radiograph of the chest is taken. My presumption is that an acute attack of miliary tuberculosis limited to lungs only, is not so lethal but quite often tends to chronicity and forms the stock of chronic miliary tuberculosis of lungs. Another phenomenon, commonly seen, is that a patient with pulmonary tuberculosis, with a limited exudative or even a chronic patch on one side, gets a localised miliary spread of the disease round about that patch or even in the contralateral lung as well. This is often revealed by X-rays and the patient who has been doing very well hitherto, takes ill acutely and suddenly. Again miliary tuberculosis may come on as a terminal phase in a case of chronic

fibrocaseous or a fibroid phthisis. SAYE describes five forms of chronic miliary tuberculosis.

(1) The chronic miliary tuberculosis of the primary infection. This may resolve completely or lead to a fatal meningitis.

(2) Chronic generalised tuberculosis starting with a non-pulmonary lesion, but eventually involving the lungs and proving fatal.

(3) Chronic miliary tuberculosis which may resolve even after four or more years.

(4) Localised hæmatogenous tuberculosis, which resembles fibrocaseous tuberculosis and becomes generalised towards the end.

(5) Non-apparent forms, which are found by X-ray examination.

X-ray Appearances.—Most striking feature on seeing an X-ray film of such a case is the measly look of the lungs. There may be, here and there, exudative patches, where caseation has been going on. In generalised tuberculosis, nothing but small white dots are discernible. In localised miliary tuberculosis round about a fibrocaseous patch, small white dots are seen. The appearance of all these, is very typical.

Acute Type.—It mimics typhoid fever in many respects and it may be impossible to decide which it is. Main points of difference are:

1. *Pulse* is fast as a rule in acute miliary tuberculosis but in typhoid it is slow, i.e. the pulse-temperature ratio is disturbed on the fast side in the former and slow side in the latter case. But, occasionally, it may be definitely slow even in a case of acute miliary tuberculosis. Though slow, it is never dicrotic as in the case of typhoid, but as the case progresses, the disparity of pulse becomes quite apparant, and it is almost never slow by the second week.

2. *Respirations*:—Are not disturbed in a case of typhoid unless complication of pneumonia arises, but in acute miliary tuberculosis, respirations are invariably rapid.

3. The *tongue* in typhoid is moist and reddish at the margins and coated in the centre with reddish papillæ standing in relief in a furred back-ground whereas in acute miliary tuberculosis, it is reddish clean all over tending towards dryness, due to high fever.

4. *Cyanosis* is a very important and characteristic feature of acute miliary tuberculosis, which is not seen in typhoid. Nails and lips get so stickily bluish that even A.P. done in such a case fails to diminish the cyanosis, though in an ordinary fibrocaseous case, after the first few refills, the nails change colour, from pale to red. I have a case in my sanatorium of an acute miliary tuberculosis (now chronic) of four months' standing. Cyanosis of the lips and nails is very pronounced in her. As signs now were getting localised in left lung, it has been decompressed, but this has not the least effect on the temperature and the cyanosis so far.

5. *Pyrexia*:—There is always some difference in the type and character of temperature in the two diseases. Mostly, it is less continued in character and shows intermissions. Typhoid, most often,

presents its typical gradual rise, maintaining a high in its second week followed by a gradual fall in the third week. After three weeks, the temperature in typhoid usually falls, but in acute miliary, it continues without abating. It is at this stage that a doubt is cast over the diagnosis of typhoid.

6. *Blood-picture and Widal Test*:—Blood picture is very confusing. Anæmia becomes much more pronounced in acute miliary tuberculosis. Leukopænia is present in both but in typhoid, lymphocytes of the large mono-type, increase. Sedimentation rate is affected more in acute miliary tuberculosis than in typhoid.

Widal Test is never positive in acute miliary, but in a case where there is previous recent history of typhoid, it may be positive upto 1 in 50 or so, whereas in typhoid, it is always very strongly positive. Because of the very close resemblance of symptoms, acute miliary tuberculosis is called "Typhoidal Type". In such cases, pyrexia, cyanosis and doubtful chest signs should at once prompt the doctor to seek help from X-rays, which at once decides the diagnosis.

Quite often, acute miliary tuberculosis follows parturition. Delivery is quite normal, the patient's health being quite robust before delivery. A few days or a week after, the patient gets an acute attack of fever with shivering and malaise and sweating, thus simulating sepsis or malaria. Continuance of fever, there being no effect of Quinine or Serum, makes it a typhoid. But, within a few days, slight cough, marked anæmia and cyanosis set in. X-ray film taken at this time reveals the real condition.

CASE NOTE:—Doctor's wife, quite healthy at marriage; first pregnancy; labour normal, fever appeared on the 6th day with rigors and malaise; anti-streptococcal serum given with no effect on temperature. Condition considered as typhoid and treated for twenty-one days as such; slight cough appeared and cyanosis became very marked. Examination of chest revealed copious rales all over; X-rayed at once and found it a case of acute miliary tuberculosis. All sorts of treatment tried, but of no avail; patient died in less than three months.

7. *Signs in the Chest*:—It is not easy to confirm the diagnosis on the basis of chest signs which are very few. Clinically, chest may present a patchy consolidation. Breath sounds may be found diminished and in its vicinity, rough breathing may be present. Occasionally, at some one area post-tussive-ales may be present which may confirm the presence of a tuberculous patch. Vocal resonance may be increased at certain areas and decreased at another. Liver is usually enlarged and so is the spleen. Abdomen may be tumid. Cerebral symptoms may appear.

8. *Treatment* is very disappointing. I have tried to decompress the lung which showed clinical signs of disease but without any effect. Coll. Iodine .8% Sol. in 10 c.c. intravenous, gives a slight relief of pyrexia and tends to turn the case chronic. Aurotherapy is of no avail. In some cases, the condition gradually settles down and the patient begins to fare well.

Extra-Pleural Pneumothorax In the Treatment of Pulmonary Tuberculosis

BY

M. Paul, L.M.P.,

Wanless Tuberculosis Sanatorium, Wanlesswadi, S. M. C. India.

THROUGH the entire history of artificial pneumothorax for pulmonary tuberculosis, some method has been eagerly sought that would effectively supplant this procedure, when pleural symphysis has precluded the utilisation of this intra-pleural space.

In 1891, TUFFIER excised the lung apex and attempted unsuccessfully to maintain the space created by the frequent introduction of nitrogen. BEAR, in 1913, introduced Paraffin with success, but in a very limited number of cases. Toy balloons have been inserted as well as elastic materials, gauze, muscle-flaps and other endogenous and exogenous substances. Only in isolated cases, had the results been satisfactory.

After TUFFIER's early series, the first definite report on the separation of the lung between the parietal pleura and the endothoracic fascia, was made by MAYER and SCHOTTMULLER. In subsequent years, a number of workers have attempted this operation.

Despite many attempts through the years by a number of men, this procedure attracted little enthusiasm. Cases not favourable by pneumothorax were selected. The extra-pleural space was early lost or air refills were too frequently given. Certainly, extra-pleural pneumothorax as a method of treatment for pulmonary tuberculosis did not attract serious attention until recently. GRAF, in 1934, developed a technique with certain important modifications by SCHMIDT and his group and this seems to have at last established a method for maintaining the selective collapse in pulmonary tuberculosis, when attempts at establishing an intra-pleural pneumothorax have been unsuccessful. Lately, the technique of this operation is much refined and used not only for upper lobe lesions but for basal lesions as well.

Taken as a valuable asset to our present surgical therapy, we have been performing this operation on some of our bad cases. Of course, it has got its own drawbacks, difficulties, and dangers as other operations do, but nevertheless, it is very encouraging when once we know the selection of cases, the technique, and the art of dissection. We had some difficulties at the outset for want of proper instruments. We find this operation most conservative, least mutilating and most satisfactory method giving immediate and effective results. Comparatively in this operation, the shock, pain and the trauma are less and easily tolerated by the sick patients who cannot stand thoracoplasty. In this operation, a greater area of the lung tissue can be collapsed in one stage operation and once it is collapsed, though difficult to maintain the same collapse in the initial period—this is our experience—

later, it is as easy as artificial pneumothorax. This is the only major operation which we can do and undo according to the clinical condition of the patient. We have been trying our utmost to find some solution to maintain the same collapse but find ourselves still in deep waters.

Indications.—Since extra-pleural pneumothorax is still in its primitive stage, the indications cannot as yet be determined with precision. However, contrary to the opinions expressed in publications upto this date, we believe, that the indications are numerous and it is frequently an operation of election. In view of the fact that the extra-pleural pneumothorax can be done in cases with moderately active bilateral lesions, it would seem that this operation holds out many possibilities. Cavity lesions, constituting indications for extra-pleural pneumothorax, are rather numerous, but they must fulfil a number of conditions, which we shall enumerate below. If these conditions are not satisfied, the danger of accident is considerably on the increase. The indications for surgical treatment of pulmonary tuberculosis should be considered from two points of view.

I. The anatomical form of the disease.

II. Its potential development.

I. Indications considered from Anatomical Point of View.—

1. The lesion must be well localised. A slight infiltration in the tissue surrounding the cavity is not a contra-indication, but extensive, dense, ulcero or fibro-caseous lesions are distinctly contra-indicated.

2. Only apical or sub-apical lesions can be thus collapsed. The reasonable lower limit of the lesions to be collapsed at present seems to be the sixth or, if absolutely necessary, the seventh rib posteriorly. The effective collapse rarely goes below the eighth rib posteriorly and the second rib anteriorly. But we have succeeded upto the third anteriorly.

3. Small central cavities constitute the best indications. It is with such lesions that the extra-pleural pneumothorax gives remarkable effect and rapid improvement.

4. Cavities situated centrally and posteriorly or centrally and anteriorly as well as lesions of the costo-clavicular angle may be operated on but *sub-cortical lesions* may not. The importance of exactly determining the situation of lesion cannot be over-emphasised. Detailed fluoroscopic examination and X-ray films in the oblique positions are indispensable. Sterioscopy and tomography are likewise of great help. We have got a home-made tomoscope which gives satisfactory results.

II. Indication from the Potential Development of the Disease.—

1. *Duration of the Disease*:—Naturally, early lesions respond better than others. They close rapidly and completely. We have, however, seen cavities of two to three years' duration, collapsed completely contrary to our expectations.

2. *Course*: Upto the present time, our operations are performed

for slightly active or quiescent lesions. In these cases, the post-operative complications are negligible.

3. *Can be performed on Children:* Our youngest is of twelve years. During pregnancy, when the operation is to be done rapidly and with the least possible shock, extra-pleural pneumothorax is likewise indicated.

4. Extra-pleural pneumothorax can be done in the presence of the bilateral lesions—of course, limited to the upper lobes, since the operative trauma is reduced to a minimum.

5. A selective localised collapse can be given in certain basal lesions of the lung.

Mixed Pneumothorax.—When artificial pneumothorax already exists but the apex is adherent and the lesion stabilised by separating the pleura along the thoracic wall, the attempt is made to collapse the apex and unite the air-pockets. We followed this procedure in 3 cases with excellent results.

Extra-Pleural Pneumothorax and Thoracoplasty.—Extra-pleural pneumothorax is indicated where the lesions are too early and too poorly stabilised to permit a thoracoplasty. When the moment for thoracoplasty has passed either due to lessened resistance or bilateral lesions, there still remain many cases which can be benefited by extra-pleural pneumothorax. It often acts as a preparatory or auxiliary operation to widen the field of indication for thoracoplasty.

N.B.:—One should bear in mind that this operation is resorted to only when the A.P. fails. The pleura should be considerably thick. In our series, four cases who were subjected to A.P. were turned on the table for thoracoplasty, due to the thinness of the pleura.

Contra-Indications.—The contra indications follow from the explanations mentioned above and are conditioned by:—

(1) The situation of the cavity.

(2) The course of the disease.

1. Extensive lesions with diffused caseous infiltration, highly organised lesions, fibroid lobitis, rigid forms and cases in which honey-comb like lesions are buried in a mass of fibroid tissue.

2. Voluminous cavities, especially superficial and sub-cortical ones, whose walls are usually weak and poorly vascularised.

3. Lesions of chronic type surrounded by a rigid shell although it is always a difficult matter to determine whether the cavity will collapse or not.

4. Diffused granular lesions, macro-nodular, and those serious types which follow an acute course.

5. Lesions accompanied by or were accompanied by purulent pleuritis or merely a doubtful fluid.

Technique.—*Anæsthesia:*—I do not like to dwell on this subject, since it all depends on the efficiency of the surgeon and the clinical condition and the psychology of the patient. As regards the posture, prone position is the type we prefer, though books suggest sitting posture which we could never attempt due to the lack of correct apparatus.

Operative Procedure:—I would like to discuss the method followed here. A para-vertebral incision about 12—16 cms. long is made, parallel to and along the lateral border of the erector spinæ muscle, begun approximately 4 cms. below the trapezial ridge and carried directly downward or with a slight obliquity outward. The trapezius muscle is divided. Often, adequate exposure is obtained by separating the fibres of the rhomboideus major over the rib of which a portion is to be excised. There is considerably less post-operative discomfort if this muscle is left intact although, if exposure is not satisfactory, we do not hesitate to cut the rhomboid throughout the length of the wound. While the section of the third rib is often the site, when the pulmonary involvement does not extend below the fifth rib, it is usually somewhat more advantageous to resect the fourth rib, if the lung needs to be stripped to the seventh rib. The belly of the serratus posticus superior is easily recognised over the third rib, whereas over the fourth, it is thinned out to little more than fascia. A curvilinear incision may be made through this, somewhat above or below the portion of the rib to be removed in order to form a flap whose suture line at closure is not directly super-imposed over the divided inter-costal muscles.

The periosteum overlying the rib is cleanly divided with care not to injure either this or the inter-costal muscles, since their integrity is necessary for a satisfactory closure. Approximately, 8 cm. of the fourth or the third rib, whatever the case may be, is then removed beginning somewhat distal to the corresponding transverse process. It is of advantage then to identify in its bed, between the internal and the external intercostal muscles, the inter-costal nerve which is removed throughout the extent of the wound, though we usually don't. This not only lessens the post-operative pain in this region, but makes the introduction of the air and subsequent refills much more free of discomfort should the site be chosen for the introduction of air. Immediately below the periosteum, which represents the bed of the section of the rib removed, the fibres of the internal inter-costal running parallel to each other can be distinctly seen. These fibres are easily elevated and divided in a straight line along the course of the rib resection. Immediately beneath there lies the very tenuous endo-thoracic fascia which, in this location owing to its thinness, often cannot be purely identified. External to this endothoracic fascia, adherence is quite firm both to the internal intercostal muscle and the rib periosteum. The separation in this case is possible, yet it is often difficult and is uniformly attended with considerable hæmorrhage. In this sub-fascial plane, however, namely between the endo-thoracic fascia and the parietal pleura, if no inflammatory reaction has thickened them, the

attachment is exceedingly thin. Surprisingly fragile and delicate rather widely separated fibrous processes unite these two structures so that with little pressure the parietal pleura is easily separated from the overlying endothoracic fascia. This is the so-called "optimum plane" or the "richtige schicht" described by SCHMIDT.

With the sub-fascial plane identified, the lips are caught by ALICE forceps and a space is made sufficient to introduce the finger on any side, either with a spoon or the blunt end of scalpel. The forefinger is introduced in this stratum with the palmar surface outward. The parietal pleura with the lung beneath is gently stripped from the chest-wall using pressure not against the pleura but against the chest-wall itself. Often, it is found that either above or below, mesially or laterally, the parietal pleura is firmly adherent to the overlying fascia. It is then necessary to abandon temporarily the stripping in this region, and having found a spot, where the parietal can be more easily freed, to follow this and in the end approach the adherent area from within outward or above downward as the case may be. It is not unusual even then to find that though the pressure exerted by the finger or the instrument is considerable the parietal pleura cannot be safely separated from the overlying structure; in that event over that particular locality it becomes necessary to establish an extra fascial line of separation and when this particular area has been freed to connect the two by sharp dissection returning to the optimum plane beneath the endothoracic fascia. After the lung is freed sufficiently, an illuminated Overhold's retractor is introduced into the opening, in order that an enlargement of the extra-pleural space may then be made under direct vision. With this light adequately illuminating, the space stripping is continued either by using the finger or a small sponge on a sponge-forceps. It is preferable to use the latter instrument possessing a moderate curve in order that its presence may not interfere with the view within the intra-thoracic space. It is of great advantage to strip the lung free into the gutter early, since it is by this procedure that a maximum space for the continuation of stripping under direct vision could be obtained. Gradually, the lung is freed from behind forward, until the cartilage of the second rib is easily discernible. Stripping is continued from below upwards to the apex. At this stage, fascial extensions as the so-called ligament over the apex, are encountered. They are usually as follows:

- (1) Transverso-pleural ligament.
- (2) A costopleural ligament.
- (3) A vertebro-pleural ligament.

According to TRUFFERT'S opinion, these ligaments form a fibrous structure by which the pleural dome is suspended. The point of surgical importance of these fibrous bands is that it is often necessary to divide these fascial attachments under direct vision by teasing process. When these bands are severed, you find a sudden drop of the apex. It is rather unimportant to mention various structures noticed when the apex is free.

It is important that the floor of extra-pleural space be made as flat as possible and the lung be freed approximately 4 cms. below the level of tuberculous involvement. The misfortunes of losing the extra-pleural space due to the re-expansion of the lung may be attributed to the following factors:

1. *Faulty Development of the Extra-pleural Space*:—The lung which becomes the floor of extra-pleural space is not at right angles with the chest-wall. The closer the two surfaces approximate to each other the greater is the danger of their becoming adherent.

2. *The Lung was not free well below the area involved*:—Adherence still remained firm between the parietal pleura and the endothoracic fascia and this not only resulted in the incomplete collapse of the tuberculous tissue, but its pressure persisted a firm tendency for the lung to return to the chest wall by gradually increasing circumferential adhesions.

3. *If the separation was made extra-fascially rather than along the optimum sub-fascial plane*, these raw surfaces were very difficult to keep apart, whereas the mesial surface of the endothoracic fascia soon would develop a mesothelium covering that would become almost as smooth as parietal pleura itself and show little tendency to adhere to the lung deep to it.

It is necessary to free the lung to the seventh rib posteriorly and to the third inter-costal space anteriorly in order that the floor may be approximately flat in order to prevent the drying of the extra-pleural space and also the flapping. It is advantageous to pack the space with warm, moist sponge, as stripping is being carried at a more distant point. After the extra-pleural space is satisfactorily established, it is washed out thoroughly with warm saline solution; usually, the bleeding is negligible. Should such bleeding point persist, electric coagulation will control them. At the time of closure, all saline solution may be aspirated or the space left filled with it; but it is all immaterial. We have tried all the things advocated in publications but the results are far from satisfactory. Just an introduction of sufficient air after closing the extra pleural space air-tight, is enough to maintain the air space inside. The wound is closed without drainage with continuous chromic cat-gut or silk if it is preferred. Great care should be exercised to approximate the inter-costal muscles and the serratus posticus superior as tightly as possible, although it is seldom that the escape of the air after the first forty-eight hours seriously interferes with the maintenance of the extra-pleural pocket. The trapezius and rhomboides major are closed with continuous chromic catgut No. 10 and continuous silk is used for the skin. It is not uncommon, 24 hours following operation—particularly when the patient has coughed considerably, to find the lung under the fluoroscopy, apparently completely re-expanded. A prompt introduction of air uniformly re-establishes the space.

The Maintenance of Extra-Pleural Space.—It is a delicate matter to maintain the pneumatic pocket. It requires constant supervision

by means of X-ray examination and the check-up of the pressure in the pocket. Fluoroscopic examination should be made the day after the operation if convenient, and repeated several times during the week following. Special attention should be given to the volume, the limits and variations of the pocket, the shape of the apex, the tracheo-mediastinal displacement towards the unaffected side and the quantity of the fluid. In the early period of pneumothorax, the pressure in the detached pocket may increase or decrease considerably within a short time. Later, these changes in the pressure give way to a more stable equilibrium. Some surgeons advocate injections of Lipiodol or some other antiseptic oil in the pneumatic pocket. Despite all our efforts in using these methods to maintain the air-space, the results are not quite convincing. For some reason or other, it is bound to get re-attached to some extent in most of the cases. It is advocated in some of the publications to use high positive pressures. As far as our experience goes, it does very little benefit; but on the other hand, is liable to do more harm in early days; for, the cellular tissues are permeable and the inflated air will merely filter into the mediastinum and the neck and thus create a subcutaneous emphysema. We believe that the maximum positive pressure, which we could beneficially use, is from 15 to 20 cms. of water, on the manometer. If we cannot achieve good collapse by this pressure, it is rather doubtful whether anything more could be accomplished by resorting to very high positive pressure. Anyway, we leave this to the choice and sound judgment of the surgeon. It is our routine to give the first refill within nine hours of the operation—as much air as the patient could conveniently take without much discomfort, paying no attention to the manometric reading. Continue daily refills for three or four days, then subject the patient to an X-ray plate or fluoroscopic examination. It is always wise, as a golden rule, to keep a special watch on the patient during the first week of the operation, because it is during this period that complications arise in thoracic surgery. If you notice any mishap, X-ray should be taken at once, preferably in bed by a portable machine. It is after the fourth day usually, that the progressive re-attachment takes place. In that event, there is no disadvantage in increasing the pressure or resorting to an extra-pleural oleothorax.

During the first ten or fifteen days, the refills should be repeated at short intervals. Later, the intervals can be lengthened one to two months, because the sub-pleural tissue does not possess the same capacity of absorption as the external aspect of the lung. The following skeletal schedule is given in one of the publications:

- * 1. Fluoroscopy—day after the operation and every day for the first week.
- 2. Give air day after the operation and every day for the first week. S. O. S.
- 3. Give air under positive pressure; about 30 centimetres of water—first week
50 centimetres of water—second week.

- 4. 2-4 post-operative weeks.
Refills every four or five days.
- 5. After the fifth week—every seven days.
- 6. Any case showing diminution of E. P. space is refilled bi-weekly.
- 7. If bi-weekly refills do not maintain the space, give oleothorax at once.
Oil used—2.5% Gomenol plus 10% Lipiodol.
Quantity—7—10 c.c. initial dose.
Then Q 5—7 days until the pocket is filled.
- 8. In 30%, effusion will occur and in many of these, there will be pus.
Treatment: aspiration, irrigation—Gomenol oil.
- 9. When oil is given, aspirate an equal amount of air. Test for positive pressure. The oil will run out of the open needle."

Complications.—The immediate post-operative accidents may be grouped as those due to decrease or increase in pressure.

- 1. The decrease in pressure has one serious consequence *viz.* the re-attachment of the apex. The remedy is an urgent refill.
- 2. The accidents due to an increase in pressure are the mediastinal herniation and sometimes massive collapse of the lung.
- 3. Subcutaneous emphysema which is very common and of no importance.
- 4. Hæmothorax due to rupture of small mediastinal and intercostal veins of sub-pleural space.
- 5. Perforations during the course of detachment. We had two accidents, who developed empyema later.
- 6. Post-operative perforations may occur from necrosis of the external wall of the cavity. It is known that the external wall of superficial cavities, especially of large ones, received its nutrient of trophic arteries from the intercostal arteries. They are newly formed vessels of cicatricial tissue, running directly from the thoracic wall to the lung traversing the adherent pleura and the endothoracic fascia. Collapse in separating the lesions from this area which supplies its vascularization causes a massive collapse. The most frequent perforations are those due to the extension of the pathologic process.
- 7. Empyæma either tubercular or pyogenic or mixed.*
- 8. Effusion of benign type which is of no significance.
- 9. Focal reactions.
- 10. There is a moderately febrile reaction upto 101° F. during the first four days following which the temperature usually returns to normal.

11. Spontaneous extension of detachment. It is not uncommon to find that the extrapleural pocket extends much farther down than created—sometimes down to the diaphragm giving the picture of a total pneumothorax in the pleural cavity. In the extra-pleural detachment as thus completed itself spontaneously, a collapse greater than intended has been obtained.

12. Immediate re-expansion: It happens only if the pneumatic space is not made air-tight and the patient has got violent coughing fits.

APPENDIX

CASE 1. R. Y. A. admitted on 23-11-38, male, aged 22 years. On admission—general condition fair, temperature 101°F , cough, expectoration and slight abdominal trouble—sputum positive for T.B. 3G by ZN; weight 87 lbs. X-ray revealed the involvement of two upper lobes with the caseo-pneumonic disease and central cavity in the middle lobe on the right side. A. P. tried but failed due to thick pleura. Phrenic crushing done on 30-11-38. There is marked clearing of the caseo-pneumonic process and also diminution in the size of the cavity, general condition improved, sputum remained positive for T.B. Extrapleural pneumothorax was instituted on 18-2-39, cough, sputum and temperature disappeared, sputum persistently negative by Gasoline method ever since discharged with the oleothorax on 3-6-39, as much improved; stayed in the vicinity of the sanatorium and was taking re-fills regularly, lung was re-expanding gradually, despite having high positive pressure to maintain the pneumatic pocket, had an attack of hæmoptysis on 14-12-39 and was re-admitted with positive sputum. X-ray revealed a small apical air-pocket with oil level in it and an open cavity; thoracoplasty was started on 14-2-40 and was completed by three stages on 16-4-40; temperature normal, no cough, gained weight, sputum again became negative, was discharged on 9-5-40. Classed as an arrested case; is in good general health.

CASE 2. N.C.J. admitted on 29-11-38, male, aged 22 years. On admission—general condition fair, low-grade fever, cough, sputum positive for T.B. and abdominal complaints; X-ray revealed marked infiltration of the upper two-thirds of the left lung with caseo-pneumonic disease and a big apical cavity; duration about a year. A. P. started on 30-11-38: partial collapse with multiple adhesions; internal pneumolysis attempt was made on 18-1-39; few adhesions were severed and found the apex adherent to the chest wall—cavity remaining the same—phrenic crushing was done on 20-2-39—cavity was still visible, though smaller in size, general condition improved to some extent, extra-pleural pneumothorax was done by releasing the apex from the chest-wall and intercommunicating and making the two pneumothorax pockets, *Mixed extra-pleural pneumothorax*—cavity closed immediately after the operation—sputum became negative, weight gained, discharged as a much improved case on 6-11-39; enjoying excellent health ever since with occasional refills.

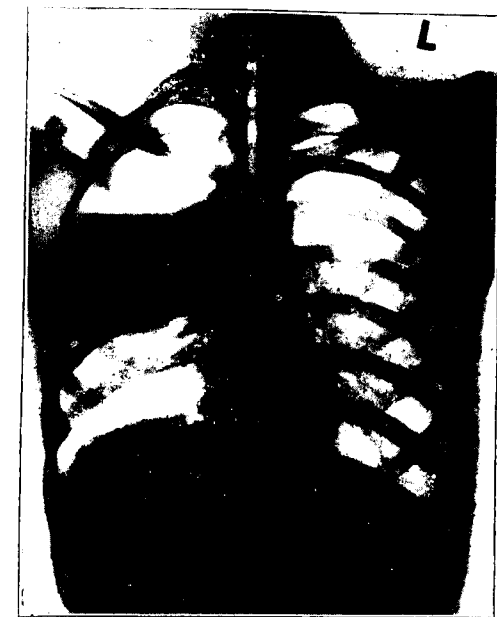
CASE 3. B. D. admitted on 9-3-38, female, aged 24 years. On

Extra-Pleural Pneumothorax—In the Treatment of Pulmonary Tuberculosis

By M. Paul.



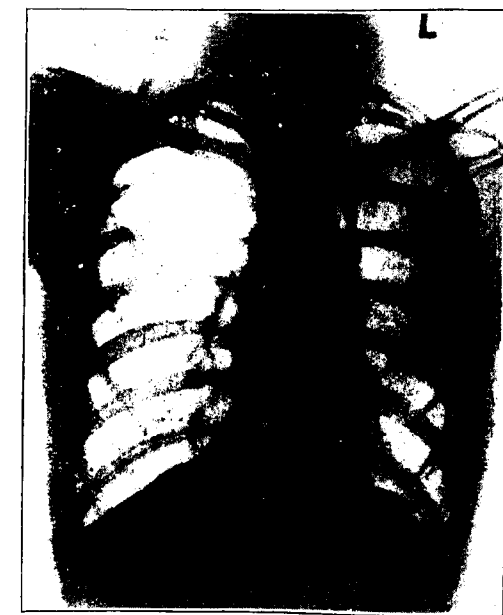
CASE 1—(a)



CASE 1—(b).



CASE 2—(a)



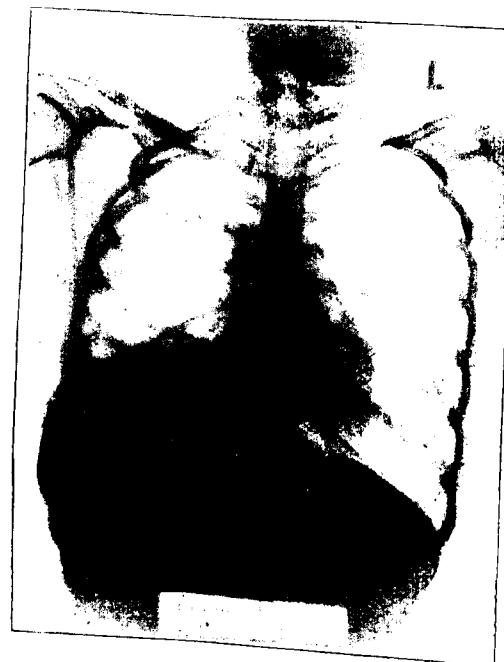
CASE 2—(b).

Extra-Pleural Pneumothorax—In the Treatment of Pulmonary Tuberculosis

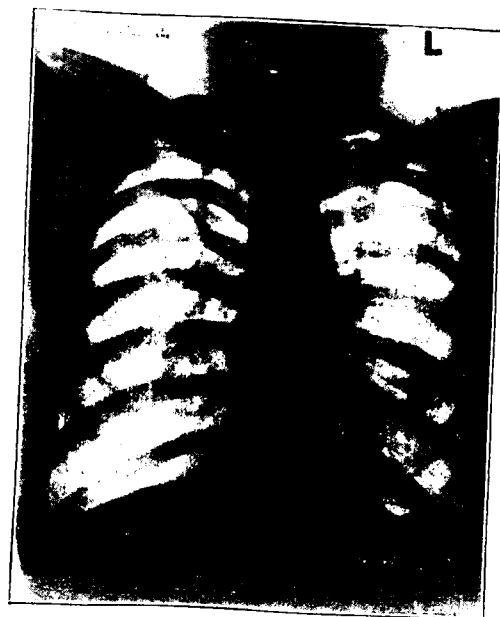
By M. Paul.



CASE 3—(a).



CASE 3—(b).



CASE 4—(a).



CASE 4—(b).

admission—general condition poor, cough, expectoration, sputum positive for T. B.—duration two years—X-ray revealed involvement of the lower lobe on the right side with multiple cavities near hila and diffused infiltration all over. A. P. started on 17-3-38, general condition improved, the cavities remained the same—right phrenic crushing was done on 4-4-38 with good effect but no apparent change in the process of the disease—on 9-5-38, internal pneumolysis was done successfully by severing cord like adhesion—still low-grade positive sputum persisted—phrenic nerve was cut on 29-1-39—sputum became negative for some time but the bacilli reappeared—pneumo peritoneum was started as an aid for the above procedure on 14-2-39, general condition improved fairly well, positive sputum persistent. Basal extra-pleural pneumothorax was done on 12-12-39, taking the sixth rib for the site of the operation—sputum became negative—gained weight steadily—discharged on 22-4-40 as a much improved case.

CASE 4. E. M. S. admitted 30-5-39, male aged 35 years. On admission—poor general condition, high temperature, cough-sputum positive for T. B.—X-ray revealed extensive bilateral caseo-pneumonic disease with cavitation at the apices on either side—bilateral A. P. started—left, on 14-6-39 and right, on 16-6-39. The collapse was partial and contra-selective. Right A. P. stopped on 5-8-39 and the lung allowed to re-expand; extra-pleural pneumothorax done on 23-11-39. His general condition improved—cough, sputum and temperature became less, began gaining weight. Left A. P. was stopped on 22-7-39 and phrenic crushing done on 15-8-39 and thoracoplasty started on 23-4-40 and completed in two stages on 9-7-40. Now, the patient has got very little cough, and sputum, is afebrile and is ready for discharge.

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Surgical Treatment of Pulmonary Tuberculosis*

BY

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Introduction.—In selected cases of pulmonary tuberculosis, surgery plays an important therapeutic role. The various surgical measures adopted in the treatment are collectively referred to by usage under the term “collapse therapy”. This includes the following procedures:—

- I. Artificial pneumothorax.
- II. Division of adhesions (Also called intra-pleural pneumolysis).
 - (a) Closed method.
 - (b) Open method.
- III. Paralysis of the phrenic nerve.
 - (a) Temporary.
 - (b) Permanent.
- IV. Sceleniotomy and sceleniectomy.
- V. Multiple intercostal neurectomy.
- VI. Oleothorax.
- VII. Extra-pleural pneumolysis.
 - (a) Apicolysis and plombage etc.
 - (b) Extra-pleural pneumothorax.
- VIII. Extra-pleural thoracoplasty, partial or complete.

Collapse Therapy.—*A great advance in treatment. Has improved results greatly.*—Tuberculosis, anywhere in the body, is a localised manifestation of a generalised disease. Tuberculosis of the lung is no exception to this truth. The introduction of sanatorium treatment about 50 years ago was an event of very great importance. It effected improvement in the health of the patient by dealing with the generalised aspect of the disease. Any improvement of the local condition *i.e.*, the lung condition, was the indirect result of improvement in the general condition. The introduction of collapse therapy gave a weapon by which the local condition also can be favourably influenced. Its intelligent application soon effected a further great improvement in results. The results of sanatorium treatment alone are very bad in advanced cases. With the best of sanatorium treatment, ten years' survival of patients is at the most 15%; if collapse therapy is used in conjunction with sanatorium regimen, the results are immensely better.

* Lectures delivered to Post-Graduates at Madras, in October 1939, under the auspices of the All-India Tuberculosis Association.

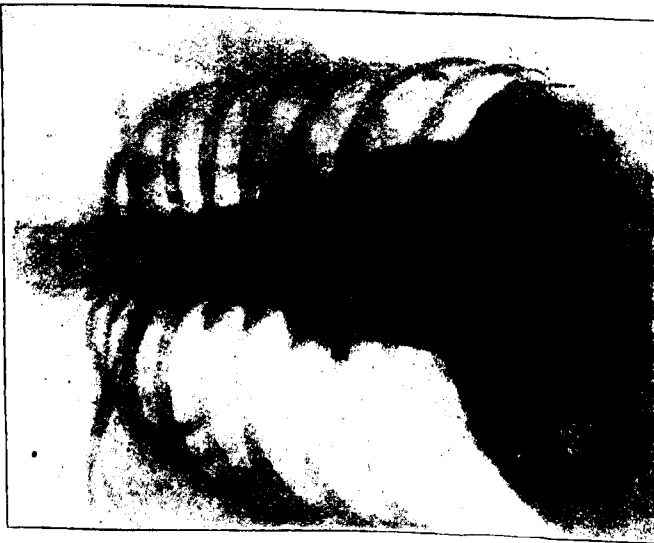


Fig. 1.—The shape of a normal lung when collapsed completely.



Fig. 2.—Collapse of a diseased lung more or less as a vertical partition due to mediastinal fixation and adhesions.

With bed rest and sanatorium treatment alone, a patient with a cavity in the lung 2 c.m. in diameter has poor chances of being alive at the end of five years. If, on the other hand, the treatment is supplemented by proper collapse therapy, the advantage is shown by the figures quoted below, which relate to cases treated in Union Mission Tuberculosis Sanatorium, Arogyavaram (Annual Report, 1937-38).

The authorities traced all patients who stayed at least a month in the sanatorium between the year 1916-1930. There were 2,604 such patients. Of these, they were able to collect information from about 1,695 patients. The following is the 5 year survival rate as assessed on these 1,695 patients.

	Among those discharged as arrested %	Much improved.	Improved.
* Stage I.	90.3 living	81.8	79.2
Stage II.	84.4	71.8	49.2
Stage III.		58.4	25.1

Out of 1,695, 898 are alive *i.e.*, 53%.

The above statistics speak for themselves on the value of collapse therapy added on to sanatorium measures. It must be remembered that ever since 1930—not to speak of 1914—tremendous advance has been made in collapse therapy; the results, therefore, are bound to further improve hereafter.

Frequency of Application of Collapse Therapy.—Collapse therapy including pneumothorax is now being applied to about 20% of all cases of tuberculosis of the lung. There is reason to believe that, with increase in hospital accommodation and trained staff, the percentage of cases getting some form of collapse therapy or other will reach 50 to 80%. This is the opinion of JOHN ALEXANDER who is a well known authority on the subject (JOHN ALEXANDER 1937). In India, now, the total number of tuberculous patients is assessed to be 2 millions. The number of beds available in the whole of India is only 2,800, a mere drop in the ocean. (King George V Thanksgiving Anti-Tuberculosis Fund, 1937 Report).

These tuberculous patients are not only suffering from tuberculous toxæmia, but the cavities produced in the lung due to sloughing of lung tissue is almost always secondarily infected. There is very severe septic absorption due to this. One of the aims of the various surgical measures is to close these cavities by collapsing the lung. The beneficial effects that are brought about by the collapse of cavities are due to several important factors.

1. *Rest*:—A normal lung, when collapsed, will take the shape as it were of contracted balloon round the hilum. (*See Fig. 1*). In diseased conditions, due to mediastinal fixation and adhesions, it collapses more or less as a vertical partition. (*See Fig. 2*). A collapsed lung is not

* The stages I, II and III refer to early, medium and advanced cases respectively.

absolutely without respiratory function. All the same, diseased portions do get a relative rest, and rest however slight is a highly important curative factor.

2. *How does collapse therapy effect improvement*:—Normal lung tissue is in a state of elastic tension. The centrifugal pull of lung tissue and radiating scar tissue around the cavity keeps it open. Collapse of the lung eliminates or diminishes the elastic tension that is antagonistic to scar contraction. The walls of the cavities in a collapsed lung fall together and heal. Indeed, this elastic relaxation is said to be the more important mechanism than even rest. Consequently, some suggest the term "Relaxtion Therapy" as a better alternative to "Collapse Therapy."

3. With the abolition of cavities, spaces where septic matter can collect are obliterated. Septic absorption and its evil effects are, therefore, abolished or minimised.

4. Chances of bronchogenic spread of tuberculosis to other portions of the lung are lessened.

5. Hæmorrhage in the lung is checked.

6. Anoxæmia and lymph stasis are said to occur and favour the production of fibrous tissue.

Selection of Cases in general, for Collapse Therapy.—Let us now pass on to a consideration of the selection of cases that can profitably be subjected to one or other of the various measures of collapse therapy. Every case of tuberculosis is not fit for collapse therapy, when first seen. A case that is fit, may be fit for one measure, but not for another. Healing of a tuberculous process depends a great deal on the patient's resistance. The various measures at our disposal can only just help him to that end. With this point of view, pulmonary tuberculosis can be classified into *two types*, the "exudative" and "the productive." The exudative type of disease is acute in onset not unlike that of pneumonia: here, there is a massive or virulent infection counteracted only by a poor defence. There is no fibrous tissue formation. The productive type of disease has, on the other hand, an insidious onset and a chronic course. There is a relative absence of exudate although there are present the typical tubercle and tuberculous granulations. Here the infection is by a few bacilli, which is opposed by a strong defence and, therefore, likely to be overcome. There is production of a lot of fibrous tissue. In a skiagram of this condition, the trachea is pulled over to the affected side.

Indications for A. P.—*The exudative type is the case fit for induction of artificial pneumothorax*:—Let us define the indications here more elaborately. If the necessity for collapse therapy for a particular case is accepted, pneumothorax must be the first method attempted. There are very few valid exceptions to this rule. All other measures of collapse therapy are a continuation of, or alternative to, artificial pneumothorax. The alternatives are to be thought of where induction of pneumothorax has been attempted and failed or

the produced pneumothorax does not improve the patient's condition for one reason or another. Having thus put the indications in general terms, I shall mention what they are:

(a) A progressive unilateral exudative type of tuberculosis.

(b) All unilateral cases with cavitation.

(c) Selected bilateral cases.

(d) Cases of hæmoptysis. This may occur not only in cases with cavitation but also in early acute stages. In the acute stage, there is congestion all round the focus of infection, a manifestation of allergic phenomenon. Hæmorrhage, as a result of this, should be considered as a fortunate event; because, it forces the patient to seek medical advice on the disease, sufficiently early. Hence, the statement "bleeders do well."

Hæmorrhage in chronic cases is due to aneurysmal dilatation of an unsupported blood vessel running across a cavity and erosion of the wall by infection. The aim of collapse therapy in hæmoptysis is not merely to stop hæmorrhage. Hæmoptysis is rarely the primary cause of death. So, what is more important is to prevent extension of the disease to the other parts of the lung through aspirated or coughed up blood and infected matter. If a patient is given a Lipiodol injection into one lung and screened, the shadow cast by it will be seen in the lung: if now the patient is made to cough, the Lipiodol will be found to be thrown, not only into the other parts of the same lung, but also into the opposite lung. In the same way, any collected blood clot after hæmoptysis will, when the patient coughs, be thrown into other parts of the same lung and the opposite lung. The clot may contain tubercle bacilli and other organisms and implant the infection wherever it is thrown. Collapse of the lung prevents this danger.

(e) Where there is pleurisy with effusion. Here, some are against routine aspiration and air replacement, and want it reserved for those cases where there is X-ray evidence of disease in the lung underlying the effusion.

Dry pleurisy, where the lung is known to be affected, should also be an indication. Delay here means running the risk of adhesions, which may prevent the successful induction of a pneumothorax, that may have to be attempted later. Indeed, for this reason, if pneumothorax is decided upon in any case, it should be done earlier in the disease than later.

Contra-indications for A. P.—There are some contra-indications to pneumothorax therapy.

These are: (1) Lesions diffused or disseminated throughout both lungs.

(2) Complications which seriously interfere with respirations e.g. emphysema.

(3) Where there is additional serious disease elsewhere as chronic heart or kidney disease.

(4) Patients above 50 are not suitable subjects.

Method of Induction of A. P.—*The Method of Induction of Pneumothorax*:—In 1820, a Liverpool physician, JAMES CARSON suggested the use of pneumothorax in the treatment of pulmonary tuberculosis. The suggestion passed unnoticed till an Italian physician CARLO FORLANINI put it to practical test in 1888. He got good results and the profession as a whole, began to adopt the method more and more afterwards.

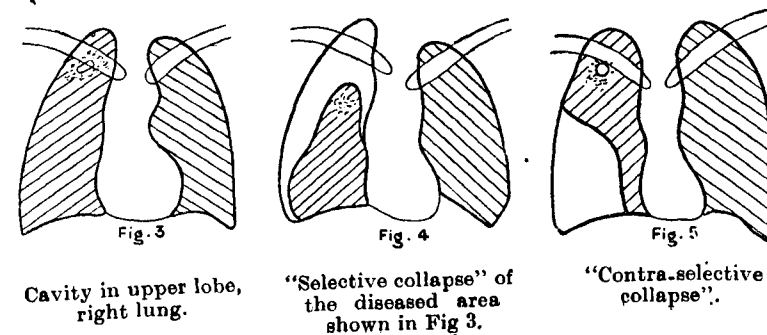
In the early days of pneumothorax therapy, experiments were tried with various gases as N_2 , O_2 , CO_2 , etc., but it is now known that air is the most convenient to use. Any type of apparatus may be used if the administrator is familiar with any particular one. The two-bottle method (Lillingston-Person pattern) is a good one. The site of introduction of the needle must avoid extensively infected areas and region of big cavities. These must have been previously judged by clinical findings and X-rays. Where there is no contra-indication, the 4th or 6th intercostal space in mid-axillary line is as good as any other. The patient lies on his healthy side arched over a pillow with affected lung uppermost. The area is cleaned with Tincture Iodine. The operation has to be done with as much ritual regarding aseptic technic as any major operation. A laxity in this very important process may mean the introduction of sepsis.

The area to be injected is infiltrated with half percent Novocaine from the skin down to sub-pleural tissue. The pneumothorax needle connected to a manometer is introduced with the stop-cock closed. On reaching the pleura, the stillette is drawn back and the stop-cock opened and the needle is gently pushed down. The advent of free oscillations in the manometer synchronising with the respiratory excursions shows the needle is in the pleura. This registers a negative reading, for example: minus 12, minus 8 centimetres of water. Now, air is slowly let in, noting the pressure and finishing with a slight negative pressure as minus 1. In the initial induction, about 250 to 300 c.c. of air is let in. Only when the pneumothorax is induced, with the idea of checking hæmoptysis, more air up to 500 c.c. can be introduced. *Pushing in air up to the point of getting a positive pleural pressure is very dangerous and unjustifiable.* If the manometer does not oscillate freely with the respiratory excursions, do not push in air. It means the needle is not in the pleural cavity. If the reading registered is positive, the needle has entered a closed cavity and here again, no air should be pushed in. If 2 or 3 attempts at different places show no free pleural space, the procedure may have to be abandoned, and other measures of collapse thought of. In fact, taking all cases of tuberculosis of the lung, only in about 10 percent is the induction successful. And again, only in half of these, is the ultimate result good. However, in no given case can one say beforehand with any amount of certainty, judging from X-ray or otherwise, whether, induction of pneumothorax will succeed or fail. Where one confidently expects to meet with a free pleura, induction may fail. Where X-rays show lot of adhesions and induction is expected to be well nigh impossible, a free pleural space is sometimes met with to the pleasant surprise of all.

An empty stomach is preferred before the initial induction, as a full stomach may be an additional source of embarrassment should dyspnoea occur. After induction, the patient must be at rest in bed for half an hour at least. He must not be allowed to walk back to the ward, but must be taken on a stretcher, as otherwise, sudden deaths have occurred. *To avoid these dangers, it is best to induce the pneumothorax in the patient's bed itself.*

Refills.—The time for refill depends on the reaction that occurs after induction. If reactions are severe, refill must be delayed. If the reaction is nil or very little, refill is usually performed on the 3rd day, introducing about 50 c.c. more than what was given at the first induction, and the process repeated in a straightforward case on the 5th, 7th, 9th, 11th, 15th day and so on, increasing the intervals, to weeks, fortnights, and then months. Where there are facilities, the quantity of air to be introduced and the intervals between refills have to be controlled by X-ray or screening. Sometimes, the lung expands most unexpectedly and rapidly even if it had remained collapsed till very recently. Re-expansion of the lung should not be allowed till the disease is quiescent for a long time. If the lung is allowed to re-expand beforehand, the visceral and parietal pleura fuse, and re-induction of pneumothorax is almost always impossible.

Selective vs. Contra-selective Collapse.—Here one may pause to describe what is meant by “selective collapse” as opposed to “contra-selective collapse”. The ideal in any case must be to collapse only the diseased portion of the lung and no more, so that not only the beneficial effects of collapse are ensured but also that no available healthy portion of the lung is thrown out of function. Such a collapse is called “Selective Collapse” (See Figures 3 and 4). Indeed, it is fortunate that if both the diseased and healthy portions collapse, the healthy portion tends to come out and by proper adjustment of refills, it is possible to keep the diseased portion only collapsed. If, on the other hand, the diseased portion remains uncollapsed and the cavities remain open while the healthy portion collapses, it is called “Contra-selective Collapse.” This is very undesirable. Measures must be taken to collapse the diseased portion also. If not, it is much better to allow the collapsed portion to come out. *The condition of contra-selective collapse must not be allowed to persist.*



Beneficial Effects of Successful Artificial Pneumothorax.—The beneficial effects of successful induction are :—

1. The cough and quantity of sputum lessen, though there is an immediate increase of the sputum just after the induction.
2. The sputum becomes tubercle-negative.
3. Septic absorption diminishes, temperature and pulse keep nearer normal and general condition improves.
4. Hæmoptysis, if present, is arrested.

The complications that may arise during induction of pneumothorax are :

- (1) Air-embolism.
- (2) Pleural shock. (Some consider this as due to air-embolism).
- (3) Puncture of lung and spontaneous pneumothorax.
- (4) Surgical emphysema.
- (5) Injury to vessels.

Complications of A. P.—Pleural effusion, simple or tuberculous may complicate A. P. treatment. Some effusion occurs in nearly 50% of all pneumo-thorax cases. This is not of much importance in itself, but if it gets secondarily infected, it is very unfortunate. These cases do badly and may require severe measures as total thoracoplasty in the end by way of treatment.

How long to continue the Pneumothorax ?—The answer to this is not easy. Roughly, it is 3 to 4 years from the day on which the collapse was made complete and not from the day of commencement of pneumothorax. It is no use stopping refills the moment the patient feels fit. It is sure to bring disaster, but a wage-earning patient, mainly by necessity and partly by ignorance, stops away.

Allowing the lung to expand is not without danger. The cavity or cavities may open and the whole trouble may restart. What is worse, the cavity may tear and empyema may result. Because of these dangers, some say so long as the patient is well and able to get on with his work, do not allow the lung to expand. At any rate, if it is known that the whole of the collapsed lung was functionally useless, and contained many cavities, it is only common sense that the lung should be kept permanently collapsed.

Before allowing the lung to re-expand in a favourable case, phrenic evulsion is better done beforehand on that side. This is necessary because the healed, contracted lung will not be able to re-expand to its original size without the danger of getting its cavities re-opened or torn.

I have discussed so far, cases where artificial pneumothorax has been successfully and usefully induced. But earlier on, I also said that induction of pneumothorax may not be possible in every case attempted. Even when successful, in a more or less degree, the expected closure of cavities and amelioration of symptoms may fail to occur.

This failure is due to the presence of adhesions between the lung and pleural layers. Adhesions almost always over-lie a cavity. They prevent the cavities from closing down. A partial collapse may cause some immediate improvement in the patient, but the ultimate prognosis in such cases is bad, unless the collapse is completed by division of adhesions or other measures.

Division of Adhesions.—This takes us on to the next measure namely, division of adhesions. When an adhesion is interfering with the therapeutic efficiency of a pneumothorax, it must be divided and the sooner this is done the better. "There is often a tendency not to consider such measures for several years, when the fortunate survivors, having wasted several years of their life and a large part of their financial resources, come under review." (ROBERTS, 1938).

*Indication for division of adhesions must be more extensive than is usually accepted :—*That an adhesion preventing proper collapse must be divided is accepted by all now. But the indication for division of adhesions must go far beyond that. BROCK (1938) says: "A few years ago, it was accepted that adhesions should only be divided if they were certainly holding and maintaining a portion of lung containing a cavity from which sputum containing tubercle bacilli was being coughed. Most experienced workers now agree that even though cavities do not appear to be present in the lung held by adhesions, and although symptoms are absent or minimal, it is not safe to leave such a lung incompletely collapsed, if study of the earlier films shows that adhesions are controlling areas of what was active disease. Cavities are lengthened and converted into slits and become hidden, but are still present unhealed and remain a menace; exudative disease is prevented from resolving and encouraged to spread by the everlasting tugging and pulling transmitted to it by each act of respiration and coughing. I am firmly convinced that in every such case, where adhesions are present and prevent perfect collapse of previously diseased portions of the lung, an attempt should be made to divide them even in the absence of positive sputum or indeed any sputum at all....."

It should not be misunderstood that any adhesion that is present must be divided merely because it is an adhesion. Many adhesions are doing no harm and need not be interfered with. To cut them would be merely meddlesome. The adhesion that is nearly always a menace, however harmless it may appear to be, is the adhesion which is overlying a portion of what has been demonstrated to be actively diseased lung tissue." (BROCK, R. C. 1938).

Technique of Operation (ROBERTS):—Technique of Division of Adhesions :—There are two methods of cutting adhesions: (1) by closed method, and (2) by open operation. In the open operation, the chest wall is opened and the bands of adhesions are reached and divided under direct vision. This is a serious undertaking, and the dangers are considerable. Majority of surgeons are very much against it. The closed method is the one usually adopted.

Preliminary Considerations :—The adhesions must be previously localised by X-ray taken in different views or by stereoscopic pictures.

In some cases, it may be possible by careful fluoroscopy and rotation of the patient to localise the adhesion. The site of the introduction of the thoracoscope must be worked out as far as possible, before the operation. It is not possible to say from X-ray films alone, except in very obvious ones, whether an adhesion can be divided or not. This can be decided only by thoracoscopic examination.

The patient should be given a refill of air shortly before operation, so that there is ample space for the introduction and manipulation of instruments without damage to the lung.

The operation is done under local anaesthesia. The area chosen for the introduction of the thoracoscope is infiltrated with $\frac{1}{2}\%$ Novocaine, infiltrating all the tissues down to the sub-pleural space. A stab incision is made through the skin, and the trocar and cannula are cautiously introduced, trocar withdrawn and thoracoscope introduced. The thoracoscope is constructed on the principle of a cystoscope and the view obtained is clear and a very wide area is well seen. The adhesions are carefully inspected and the feasibility or not of their divisions judged. Some require great care lest the lung be injured. When lung tissue extends out along the adhesion, it gives it a bluish instead of the usual creamy colour. Very close proximity to important blood vessels as the sub-clavian artery may preclude the possibility of dividing them. When the extent and thickness of an adhesion is uncertain, through a separate puncture a Maurer's hook is introduced, the adhesion palpated and its divisibility decided. Having decided that the adhesion can be divided, through another puncture, the cautery is introduced and adhesions divided. This second puncture should be so made that the cautery will be working at right-angles to the line of adhesions rather than parallel to it.

The division should be made nearer to the chest wall than to the lung surface as a general rule. If there is any blood vessel seen running along the adhesion, it should first be coagulated by diathermy. In some cases, where the lung tissue is close on to the chest wall, and the adhesion is short and thick, the adhesion can be enucleated as it were off the chest wall, making the base of the adhesion float upon a bed of infiltrated Novocaine as recommended and performed by MAURER. If the adhesions are too thick, and there is danger of dividing the lung, the operation must be abandoned. In some cases, a thick adhesion is capable of division in stages. It is first cut through as far as it is safe. When re-examined after a few days, it is seen that the adhesion left uncut has stretched out and thinned, and the lung tissue has fallen away from the chest wall. The division can now be completed safely. Having divided the adhesions, the cannulae are withdrawn, and the puncture holes in the skin sutured and a pad strapped firmly over the area to prevent surgical emphysema.

Two Cannulae vs. Single Cannula Method:—The two cannulae method described above is better than the one recommended by CHANDLER, where, through a single cannula, both visualisation and division of adhesions can be performed. The difficulty in this latter

method is that the thoracoscopic view is very much more restricted than in the former method and the manipulation of instruments is also more difficult.

Complications:—The operation of division of adhesions requires constant patience, care and skill. Granted these, the results of the operation have been very gratifying. The various complications that may follow the operation are: (1) injury to the lung, (2) injury to vessels and severe hæmorrhage, and (3) serous effusion. The effusion may become tuberculous or secondarily infected.

Phrenic Operations.—By paralysing the phrenic nerve of one side that half of the diaphragm is paralysed. This procedure has a distinct field of usefulness in selected cases of pulmonary tuberculosis. The operation was first suggested by STUERTZ in 1911. The paralysed diaphragm rises up half to as much as 4 inches in some cases, and in a favourable case, even more. The height to which it rises is largely governed by the presence or absence of adhesions and by the extent to which the muscle is deprived of its nerve supply. The rise of the dome into the thorax may continue for 2 or 3 months as the muscle fibres atrophy. The extent to which the lung volume is diminished by this has been variously estimated as being from $\frac{1}{4}$ to $\frac{1}{2}$ of its total and upon this depends the degree of pulmonary rest afforded. Further, if there has been spasm of the diaphragm before, its abolition causes great relief to the patient. MORRISTON DAVIES says, "The relief of such symptoms as pain, aching drag, tightness round the base of the lung, tachycardia, when the pericardium is involved by basal adhesions, is amongst the most immediate results of hemidiaphragmatic paralysis. It may have considerable influence also on cough and sputum. That form of dry, recurrent cough due to irritation of the diaphragm is completely abolished, the bringing up of sputum is facilitated because of the expulsive force of the abdominal muscles acting directly on the lung and is no longer damped by the semi-rigid tonically contracted muscle". (MORRISTON-DAVIES, 1930.)

Indications for Phrenic Paralysis are:—

(1) In basal tuberculosis as an addition or an alternative to pneumothorax.

(2) In certain apical lesions. The effect of partial collapse due to phrenic paralysis is not limited to the base. This is illustrated in some cases by the great diminution in size of cavities near the apex. Several observers have recorded the healing of apical lesions by phrenic paralysis alone.

(3) In cases of more generalised tuberculosis, where artificial pneumothorax has been tried and failed or found incomplete and the case not suitable for thoracoplasty. The operation in some cases may be used as an alternative to division of adhesions that are holding out cavities during A. P. treatment.

(4) For the relief of symptoms such as pain, dragging cough and tachycardia.

(5) As a preliminary to thoracoplasty; the number of lower ribs which require excision is lessened. Some surgeons do a phrenic evulsion invariably before every case of thoracoplasty.

(6) As a preliminary to letting out a lung which had been kept collapsed by artificial pneumothorax. The reason for this had been explained earlier.

(7) Selected cases of hæmoptysis.

Anatomy of the Phrenic Nerve:—The phrenic nerve arises from the 3rd, 4th and 5th cervical nerves (anterior primary divisions), the main contribution being from the 4th. The nerve runs downwards and inwards in front of scalenus anticus muscle behind the prevertebral layer of cervical fascia. At the root of the neck, it crosses in front of the sub-clavian artery, enters the thorax running posterior to the innominate vein. It descends along the lateral border of the mediastinum anterior to the root of the lung to reach the diaphragm, where it breaks up into branches, pierces it and supplies it from the under surface.

Accessory Phrenic Nerve:—The accessory phrenic nerve arises from the 5th cervical and descends into the thorax, either in company with the nerve to the sub-clavian or separately. It usually joins the phrenic nerve at some point between the 1st rib and the root of the lung. According to ALEXANDER, an accessory phrenic nerve is present in 20 to 30 percent of all persons. Other authorities believe it is present even more frequently. A simple division of the main phrenic nerve does not sever these important contributory fibres; the results of the operation are apt to be ineffectual, unless the accessory phrenic nerve connections are also removed at the same time, by avulsing the main nerve or by deliberately searching out the accessory connection and dividing them.

Temporary vs. Permanent Phrenic Paralysis:—The nerve can be temporarily or permanently paralysed. Temporary paralysis has one very great advantage, viz., if, after paralysing the diaphragm, the expected benefit does not occur, no permanent damage to the lung has been done, for the paralysed diaphragm recovers in the course of 3 to 6 months. (See Fig. 6 and 7). Again, in a case where one is not sure whether or not paralysis of the diaphragm will favourably influence the condition, one can see the effect of temporary paralysis and if this proves beneficial, the paralysis can later be converted into a permanent one.

Technique of Phrenic Operation:—The operation is usually done under local anæsthesia. A horizontal incision is made about an inch long and an inch above the clavicle, the middle of the incision being a little posterior to the posterior border of the sterno-mastoid. The platysma is divided, the posterior edge of the sterno-mastoid is defined and drawn medially, the omohyoid is freed along its lower border and drawn upwards. The posterior border of the scalenus anticus is defined. Now the phrenic nerve may be seen lying in front of the scalenus

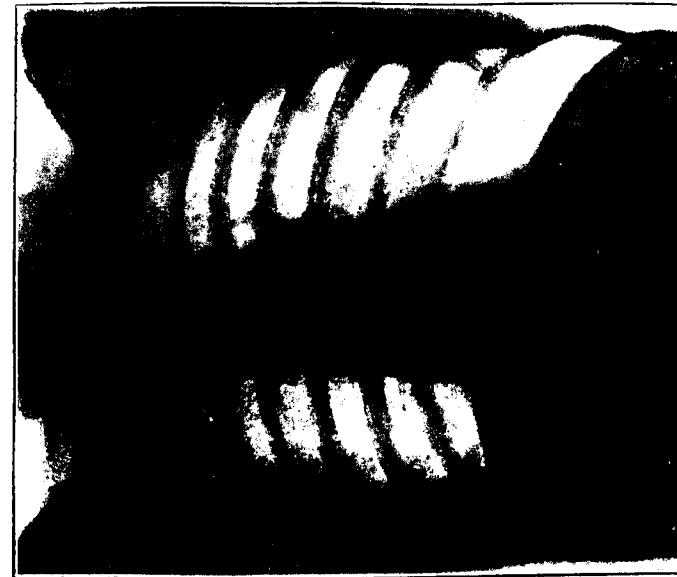


Fig. 7.—Same case as Fig. 6. X-ray taken a year later. Note that the diaphragm has recovered and come back to normal position.

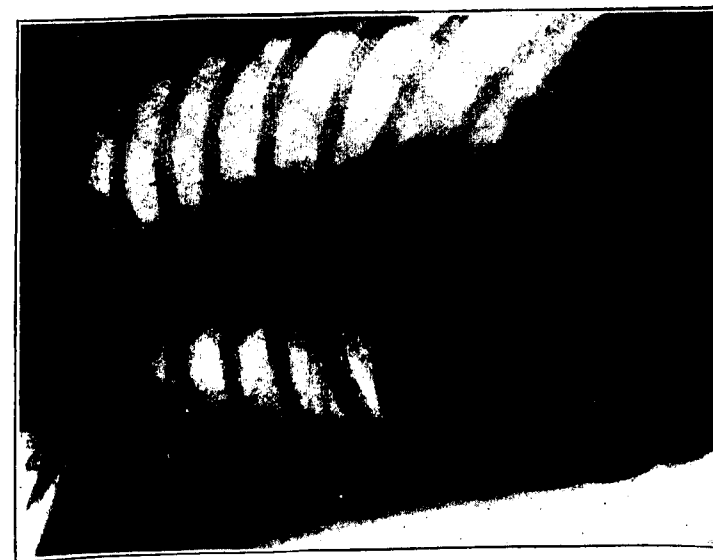


Fig. 6.—Raised right dome of diaphragm due to paralysis after phrenic crush —(Temporary paralysis).

anticus shining beneath the pre-vertebral cervical fascia. *Before dividing this fascia, it is a great advantage to thus see the nerve and localise its position.* This is important and it is of great help, for if the fascia is divided before-hand and the nerve is not evident, every strand of fascia may resemble a nerve and cause confusion. In very many cases the nerve is easily identified. In a difficult case, possible abnormal positions of the nerve must be remembered. In some cases, the phrenic nerve may pierce the muscle or it may cross it higher up or lower down than normal. In some, the phrenic nerve runs along the outer border of the scalenus, closely bound with the supra-scapular nerve, till just above the clavicle, the latter nerve runs abruptly outwards and the phrenic nerve abruptly inwards.

Having found the nerve, if permanent paralysis is decided upon, the nerve is avulsed as follows:—Inject 1% Novocaine into the nerve and cut it across between two clamps. Then, by a combination of traction and twisting on the distal end of the nerve, 10 to 12 c.m. of it is pulled out and cut across. This procedure is necessary to be sure that the connections of the accessory phrenic nerve are also removed. If not, the accessory phrenic connections may remain and if it is responsible for a greater proportion of the nerve supply to the diaphragm, as sometimes happens, the ensuing diaphragmatic paralysis may be imperfect. However, sometimes in the process of avulsion of the nerve, there may be severe pain or transmitted pulsation noted. In such cases, the avulsion may be stopped and the exposed length of nerve cut away. To be doubly sure under such circumstances, the nerve to the sub-clavius is then found and also search is made for any possible accessory nerve bundle, arising from the surface of the brachial plexus and running downwards and inwards towards the phrenic. A short length of each of these nerves is excised.

In temporary paralysis, the main phrenic nerve is crushed with a mosquito hæmostat and the accessory phrenic nerves, crushed or cut.

The following accidents which, though very rare, have been recorded in these operations:—Injury to sub-clavian vein, internal mammary artery, the phrenic artery, injury to the lower part of the brachial plexus, sympathetic nerve etc.

Scaleniectomy and Scalenectomy.—These have been used by some surgeons in combination with phrenic paralysis, some have proposed these operations to supplement thoracoplasty and extra-pleural pneumolysis or a pneumothorax with apical adhesions. Scalenectomy has been recommended as a means of making easier the resection of the anterior portion of the 1st rib during a subsequent thoracoplasty.

Multiple Intercostal Nerve Paralysis.—By this, the intercostal muscles are paralysed permanently by resection of the nerves or temporarily by crushing or injection of Alcohol. By this, respiratory movements are lessened on the operated side and a degree of pulmonary rest has been procured. It has been noted that a month after

operation, the circumference of the chest on this side had decreased 4 c.m. and the circumference of the contra-lateral side had increased 1.5 c.m. The operation benefits a small group of patients in whom pneumothorax has failed because of pleural adhesions and prolonged bed rest and phrenic paralysis have been found to be inadequate. If thoracoplasty is contra-indicated in these patients for some reason as bilateral lesion etc., intercostal neurectomy may benefit some of them. The real indication is in this type of patients or to prepare patients for thoracoplasty that will obviously be necessary to close large pulmonary cavities but for whom thoracoplasty at the time is contra-indicated. Intercostal neurectomy should not be used as a last resort for desperately ill patients.

Oleoathorax.—5 per cent Gomenol in olive oil has been used in varying quantities up to 200 c.c. injecting the solution into the pleural cavity in certain selected cases. The procedure is not quite popular and is largely given up now.

Extra-pleural Pneumolysis.—TUFFIER in 1891 conceived the idea of separating diseased areas of the lung together with the overlying adherent parietal and visceral layers of the pleura from the thoracic wall, and keeping the diseased area collapsed by maintaining increased pressure through various means in the extra-pleural space. His early attempts to keep this area collapsed by putting in air failed; he later limited his operation to collapsing the cavities in the upper part of the lung and maintained the compression effect by the insertion of a graft or foreign substance—"apicolysis". Various substances as muscle, (portion of pectoral muscle pedicled at one end), lumps of fat, paraffin etc., were used. These methods have not been very successful. Especially, when paraffin was used, there was a great danger of its eroding into the cavity and fistula with the bronchus resulting. These complications resulted in infection of the space created and so led to great mortality. Further, though there were improvements in some cases, there was reason to believe that at least in some others, the apparent closure of cavities in X-rays was due to the dense shadow cast by the paraffin hiding the cavities. These operations are falling into disfavour.

However, air is being used again to keep the cavities closed down by creating a pneumothorax in the extra-pleural space. TUFFIER originally failed in his attempts because (1) the lung was not freed sufficiently well, i.e. an apicolysis was performed where a pneumolysis should have been done; (2) the refills to prevent air being absorbed were not frequent enough; (3) the air was not kept under high + V. E. Pressure about +20, that we now know to be necessary.

Extra-pleural Pneumothorax:—This renewed operation of extra-pleural pneumothorax has received an extra impetus in its rebirth and is being employed on a larger scale. The indications for the operation as at present understood may be defined as follows:—

Indications:—(1) In patients where though permanent collapse is desirable, they are too ill for a thoracoplasty.

(2) In patients where, though permanent collapse is desirable, the disease appears too mild to justify a thoracoplasty.

(3) In children and young people where thoracoplasty will probably lead to severe scoliosis.

Technique of Operation:—The operation can be done under local anaesthesia and has been done more often under local than under general anaesthesia. In nervous patients, Gas and Oxygen or Cyclopropane has been used. An oblique incision 5 to 6" long is made in the line of the fourth rib posteriorly and 4" of the rib removed. This seems to give the best access necessary. Sometimes, the 3rd, 5th or even the 6th rib has been resected knowingly or unknowingly and has not made the operation difficult. Once the rib bed has been exposed, the proper anatomical layer is found i.e., the immediate extra-pleural zone. In the normal chest, there is an extremely delicate layer of areolar tissue between the parietal pleura and chest wall. In disease, this becomes thick and well defined, and is then called "endothoracic fascia." *All stripping is done between this layer and the parietal pleura.* If not, bleeding is troublesome and even dangerous. The operation field is kept illuminated with a specially made malleable holder carrying a light at its end. The field must be kept dry. The dissection is carefully proceeded with a swab on a holder and in places with the help of the finger. *If the adhesions at the apex are very firm and stripping is difficult, it must not be broken through. The operation is better abandoned.* For, in such cases, disastrous complications have arisen. The wall over the cavity sloughs and the extra-pleural space gets infected, which is a dangerous complication.

Where the separation proceeds smoothly, it is necessary to free the lung well all around—exactly to the same extent as the lung is freed by an artificial pneumothorax in the absence of adhesions. In other words, it must be separated not only from the lateral chest wall, but also from above, from front and from behind. After proper strip, the wound is closed in layers.

A pneumothorax needle is now inserted just above the wound and a refill of 200 to 400 c.c. of air given until the pressures are just positive. The patient is returned to bed and placed in the sitting position. *A second refill is given about six or seven hours later, a third after another 12 hours and then daily refill for a few days. These frequent refills in the 1st 24 hours and later are very necessary and I know of some failures where the reason was partly due to not observing this necessity.* A radiogram is taken on the day following the operation and about every third day, for the next fortnight. The spacing and pressure of subsequent refills are decided by the radiographic appearances and the rate at which pressure falls between the refills. An attempt is made to keep the pressure at +14 to +20. It is very important that the lung should be kept down from the very beginning, as, if it expands in the first few hours, it may be impossible to obtain a good collapse again. (ROBERTS, 1938).

In some cases, after complete separation of the lung from the

chest wall, the cavity is held open by the septum of pleura that separates the intra and extra-pleural pneumothorax. This barrier has been divided a few days later (or even at the same time perhaps) and very good results have been obtained, the cavities collapsing completely. (R. C. BROCK, 1938).

Complications that may arise after the Operation:—The post-operative complications that have arisen in some cases are:

- (1) Hæmorrhage.
- (2) Late effusion.
- (3) Infection of the cavity with tubercle or secondary organisms.

These complications have been seen, but the good results obtained have been far greater. It is too early to say what the ultimate results of these cases will be. But the immediate results have been very gratifying.

Extra-pleural Thoracoplasty.—This is the most serious of the undertakings. In this operation, depending upon the extent of the cavities, varying lengths of the ribs are excised. Artificial pneumothorax and temporary phrenic paralysis are revocable measures. Thoracoplasty is a permanent and irrevocable measure, forced upon the surgeon, because other measures of collapse therapy have not been possible or have been tried and failed.

Choice of Cases for the Operation:—For success in this operation, a proper choice of cases is necessary. The ideal type of case is the one with unilateral infection of the chronic type with multiple cavities. Here, there is good evidence of fibrous tissue formation, that is the productive type of disease mentioned before. In X-ray, trachea is found pulled over to the affected side. Having these factors in mind, ARCHIBALD enunciated, "Do not operate, if the trachea is in the middle line," meaning thereby that cases without demonstrable evidence of scar formation won't stand this operation.

From the surgical point of view, these patients can be divided into three groups:

- (1) Those that are recovering without any special treatment. Obviously, no operation is required here.
- (2) Those that are rapidly going downhill. No surgery is possible here.

(3) *Operation to be done when resistance is in the up-grade*:—There is a type of case which deteriorates and then improves in a sort of step-ladder fashion. It is this type of case that should be submitted to operation at a time when the patient is in the up-grade. That he is in the up-grade will be shown by an increasing or at least steady weight, a normal or slightly raised temperature or pulse, and by blood tests. If the sedimentation rate is over 40, he is unfit.

Modification of Sauerbrück's Indications:—SAUERBRÜCK originally gave the following indications for thoracoplasty:—

- (1) Unilateral disease.
- (2) Fibrotic lesions.
- (3) An apyrexial patient.
- (4) Good general condition.

The indications as modified to-day are:

(1) Unilateral fibro-cavernous disease in a patient, otherwise reasonably fit and well.

(2) Similar cases in which only a contra-selective collapse is possible.

(3) Tuberculous empyema with underlying unilateral disease, when conservative measures as frequent pleural aspirations and wash-outs have failed.

(4) Repeated hæmoptysis failing to be controlled by other measures.

Contraindications for Thoracoplasty:—(1) Age below 18, (severe scoliosis occurs in these cases). In these patients, now-a-days, one will perform extra-pleural pneumothorax. In patients above 50, mortality is very high. Best results are obtained in cases between the ages of 25 and 35.

(2) Local pulmonary lesions. Fluffy progressive lesion, bilateral disease, associated with bronchiectasis etc.

(3) Important tuberculous disease elsewhere, which is rapid and progressive. This statement requires some modification. *Laryngeal and abdominal tuberculosis are not contra-indications*. They are really the result of frequent coughing up or swallowing of tubercle-laden sputum, and naturally improve with the collapse of cavities and resultant abolition of infection. *In fact, laryngeal tuberculosis and abdominal tuberculosis must be considered as indications for collapse therapy*.

(4) Important extra-pulmonary non-tuberculous disease as severe cardio-vascular or renal disease, any wasting disease of the amyloid type. Diabetes, once considered a contra-indication, is no longer so, insulin having robbed it of its many dangers.

This operation of extra-pleural thoracoplasty has gone through various modifications and several improvements in technique but still remains a serious undertaking.

In the earlier days, the portions of rib resected were either too small to cause collapse of cavities or to compress the lung sufficiently to arrest the disease, and the general results were unsatisfactory. Without going into details of the older methods, a brief mention of important facts learnt by experience from the success of the operation can be mentioned.

(1) *The operation must be done in two or more stages*:—These patients have suffered from long continued toxæmia and the heart is

in a condition of myocardial degeneration. If too much is attempted in one stage, mortality is very high. The important thing to remember is that the operation can be stopped at any stage and must be stopped the moment the anaesthetist thinks it is dangerous to proceed. I have seen a case, where just the skin and muscles were incised, when the anaesthetist said the patient's condition was unsatisfactory. The surgeon at once closed up the incision and put him back to bed. In this particular case, thoracoplasty was being attempted to close a tuberculous empyema cavity. Nevertheless, it emphasises forcibly what I want to stress. The patient was given a blood transfusion and the operation was re-attempted 5 or 6 days later. The time spent in going down to the ribs was very little now, the edges of the old incision had just to be splayed apart. The time thus saved does count in these serious undertakings. The surgeon removed just one rib at the first sitting. So on, this operation went on in stages and in the end, there was a live patient considerably better. Had only the surgeon first carried on thinking he could just remove one rib, he would have removed a rib and the patient also. I have heard this surgeon stress more than once that if the condition of the patient demanded it, the 12 ribs may have to be removed in 12 stages.

(2) For the same length of ribs removed, it is absolutely essential to remove that portion posterior to the angles than anterior. For the same length of ribs resected, with posterior resection, you get much more relaxation i.e., much more collapse.

(3) To get good relaxation, you must remove the 1st rib totally. Removal of 3 to 4 c.m. of it is not sufficient. The 2nd and 3rd ribs also are removed entire, and lower down, you remove less and less as indicated.

(4) If long lengths of several ribs are removed at a time, not only is shock great, paradoxical movement occurs and this produces dyspnoea and spreads tuberculosis by bronchial spread. If you remove the whole of the 4th, 5th & 6th ribs in one stage, terrible paradoxical movement occurs; to avoid it, remove posterior part first; the scapula covers the gap. Later, remove the anterior part in a separate stage.

(5) The intervals between operations should not be unduly long, for the periosteum regenerates and produces irregular relaxation. To delay regeneration, the periosteum is painted with 20% Formalin by keeping a gauze soaked in the solution in the rib bed for a minute or two. The interval between operations is preferably 10 days to 2 weeks and not more.

(6) *Semb's Modification*: The improvement of CARL SEMB and HOLST:—SEMB demonstrated the fact that in normal individuals bands pass from Sibson's fascia to apex of pleura. Three particularly strong ones pass between brachial plexus, and sub-clavian vessels (See Fig. 8.) His operation consists in upper stage thoracoplasty with division of these bands in a plane well above the pleura. The chest wall is made to fall over the collapsed lung and regeneration of the ribs in this position allowed, which prevents reopening of the cavity.

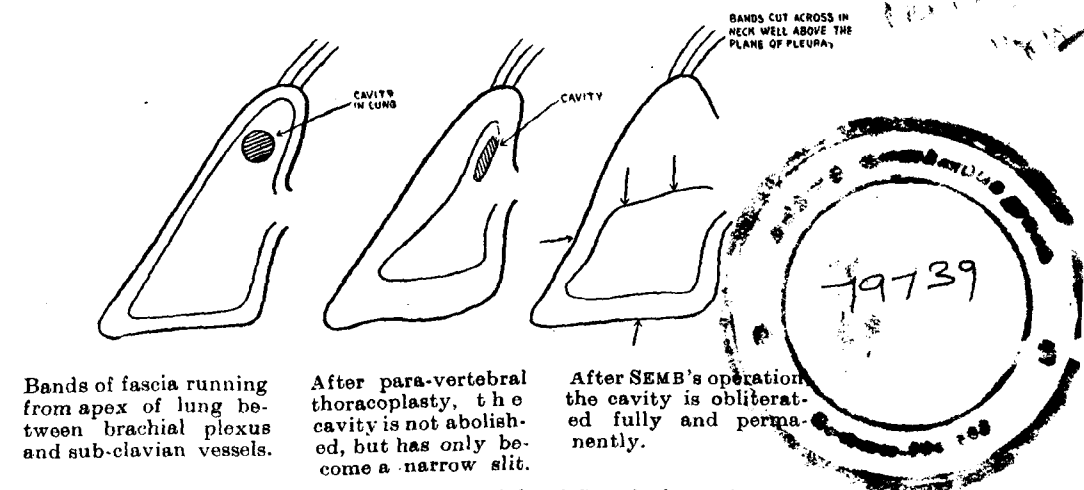


Fig. 8.—To illustrate the principle of SEMB's Operation.

(7) If maximum degree of collapse is required, the 12th rib must be resected at the last stage.

(8) *Preliminary Phrenic Paralysis*:—A preliminary paralysis of the diaphragm is indicated in most cases to reduce the size of cavities after which, the general condition of the patient normally improves. It also assists the collapse by diminishing the danger of aspirating pus into the lower lobes and limits the extent of rib resection.

(9) *In doing operation in stages, it is better to proceed from above down.* The operation can then be stopped where you want, but if begun from below, you have to proceed and remove the whole lot. Otherwise, the upper ribs stick out and prevent proper falling in of the chest wall.

Choice of Anaesthetic.—Any anaesthetic, which makes the patient cyanosed and dyspnoeic, is bad. Chloroform being a cardiac poison is best avoided. The anaesthesia must be such as can be induced smoothly, and recovery must be quick. Therefore, regional and local anaesthesia is best. SEMB does all his operations with local anaesthesia. If general anaesthesia is used, Cyclopropane which can be administered with 85% Oxygen is best, as against Nitrous Oxide which can be administered with 15% Oxygen only. But Cyclopropane is not yet available in our country and Gas and Oxygen is the next best.

Technique.—Position:—"The patient lies on a flat operating table across an air cushion, which is placed under the good side and so gives a convexity towards the side of the operation which tends to open up the intercostal spaces. Upper arm hangs forward over the side of the table, which is then tilted into 15° Trendelenburg's position so that any secretion from the collapsing lung will come into the trachea, rather than into the opposite lung, and be coughed up." (ROBERTS).

Incision :—The incision should be in the form of inverted J, starting from the 7th cervical spine level running vertically down and turning forward below the angle of scapula to the mid-axillary line. It should not cross the middle line but should be 1" medial to the vertebral border of scapula. In doing the operation in stages, the incisions must be so planned that a sufficient area of skin is left between each, so as not to interfere with blood supply. The incision must be free and in the upper stage, is such that the scapula falls forward without the necessity of forcible instrumental retraction which increases shock.

The ribs resected extend from the tip of the transverse process to as far forwards as the extent of the disease requires. It is not necessary to remove the transverse process of vertebrae and head and neck of ribs. Removal of these increases the shock and dangers of the operation without compensating advantages. The resection of the 1st rib is easier if attempted after the 2nd and 3rd have been removed. On the operation table itself, patient is given per rectum 1000 c.c. of 5% glucose in tap water at 105° F. The wound is closed by one continuous catgut suture for the muscle and a second for the skin and drained for 24 hours with a rubber tube through the most dependent portion of the incision. The side of the chest must be firmly strapped over the dressings to prevent paradoxical movements of the decostalized chest wall. Before the patient leaves the operation table, the patient is encouraged to cough up any sputum that has been squeezed out of the lung.

Post-operative Considerations :—(1) These patients bleed a great deal at the operation, the incision being through thick muscles and long. So, as much as 40 per cent of the patients require a post-operative transfusion. If hæmoglobin is below 60 per cent, transfusion is done as a routine.

(2) Patient is best kept in an oxygen tent, the concentration of oxygen being at a minimum of 65 per cent. The nasal catheter used for administering oxygen must have the tip seen below the uvula; otherwise, it is no good. The catheter is best fitted on to a spectacle frame.

The operation must be always followed by 4 to 6 months of sanatorium treatment.

Post-operative complication :—(1) Heartfailure :—Administration of glucose rectally or intravenously, oxygen tents, blood transfusion given slowly etc., are the measures utilized to counteract it.

(2) High fever, 107° and so on, due to auto-tuberculinization. Some deaths have been due to this cause.

(3) Pneumonic complications.

CASE REPORT :—The following case shows the benefit that can be derived by thoracoplasty where indicated.

A female aged 29 years, had fever and cough for a month prior to admission on 8-3-1939. Sputum showed tubercle bacilli. Skiagram

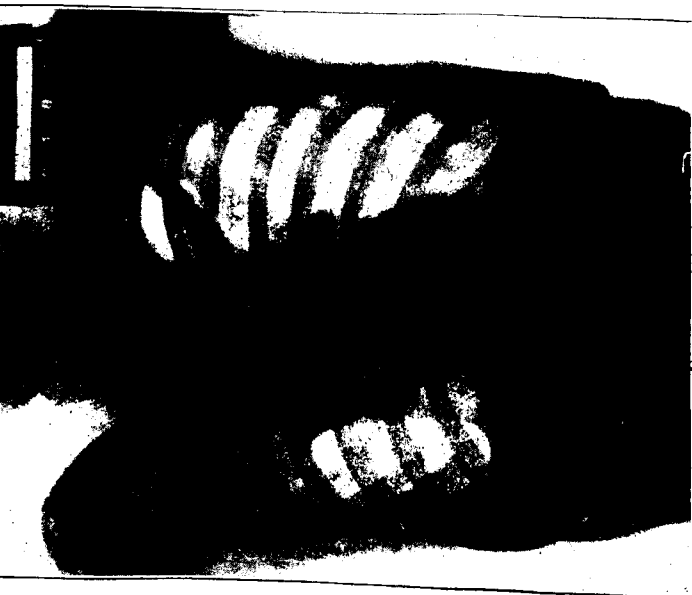


Fig. 9.—Skiagram showing contra-selective collapse of right lung. Patient was having swinging temperature, cough and positive sputum.



Fig. 10.—Skiagram of same case 6½ months after thoracoplasty. Is now ambulant. Has no fever or cough. Has put on 20 lbs. weight.

showed diffuse infiltration in the right upper lobe. Artificial pneumothorax (14 fills) and Solganal B injections improved the general condition only temporarily. The collapse of the lung was contra-selective (See Fig. 9) and six months after admission the patient again began having cough, night sweats, and swinging temperature. Sputum still showed tubercle bacilli.

On 11-2-40, under regional anaesthesia, an upper stage thoracoplasty was performed removing the third, second and first ribs entirely. On 26-2-40, the second stage thoracoplasty was performed removing fourth, fifth, sixth and seventh ribs from the level of the tips of the transverse processes to the anterior axillary line. Very good collapse of the upper lobe now occurred. (See Fig. 10.)

Ever since, few days after operation, the patient is keeping normal temperature, has no cough and is now sputum-free. She is now walking about and has put on 30 lbs in weight. Her present weight is 90 lbs, her best was 94 lbs. and least during illness was 70 lbs.

Collapse Therapy in Bilateral Disease.—An increasing number of cases have been successfully subjected to bilateral selective pneumothorax or selective pneumothorax on one side and phrenic avulsion or limited thoracoplasty etc., on the other side. Bilateral extra-pleural pneumothorax also may be possible. The results of recorded cases so far have been very encouraging. More than a third of the lung on each side should not be collapsed.

Summary and Conclusions.—1. Collapse therapy has established its valuable place in the treatment of pulmonary tuberculosis. Whereas, a patient with a cavity 2 c.m. in diameter, even with bed rest and sanatorium treatment, has poor chances of living at the end of 5 years, the survival rate of patients who get the additional benefit of properly applied collapse therapy is 53%.

2. In India, about 2 millions are assessed to be suffering from pulmonary tuberculosis, while the available hospital accommodation for them is only 2,800.

3. The various methods of collapse therapy and the choice of cases for each method is discussed.

4. Particular attention is drawn to the necessity for a more extended application of division of adhesions. *Adhesions, overlying areas of lung which previously contained cavities, must be divided "even in the absence of positive sputum or indeed any sputum at all" and even though skiagrams show the cavities to have collapsed.*

5. The technique of various operative measures is briefly described.

6. Extra-pleural pneumothorax is now being applied more extensively and more successfully. The reason why previously the method failed is discussed.

7. Apart from the value of collapse therapy to the individual

patient, its importance from the point of view of prevention of spread of the disease to other people is even greater. One patient cured means one source of infection abolished. From the point of view of the community, this is a very important consideration.

In conclusion, I may say that collapse therapy is sure to find rapidly increasing application in our country very soon with enormous benefits to the unfortunate patients.

Acknowledgments:—I wish to acknowledge the great help rendered to me by Dr. P. Arunachalam and Dr. C. Ragavachari in the preparation of this paper. My thanks are also due to Major J. F. Shepherd, I.M.S., and Dr. R. Viswanatham for permitting me to report on their cases; to Dr. P. Kesavaswami for the skiagrams reproduced here; and to Dr. P. V. Benjamin and K. Vasudeva Rao, for the statistical figures connected with their Institutions. I also wish to mention my indebtedness to Mr. J. E. H. Roberts and Mr. R. C. Brock, of the Brompton Hospital, London, from whose teachings and writings I have freely quoted.

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Mental Factor in the Healing of Tuberculosis

BY

Rai G. C. Chatterjee Bahadur, M.B. (CAL), F.R.I. (LOND).

Calcutta.

SYDENHAM was the first to define 'disease' as physiology of pathological condition or, as has been termed, pathologic physiology of some organs of the body i.e. the function which has its origin in the changed or pathological condition of an organ, and differs from its normal function or what is termed dysfunction, is called disease, thereby reversing the old humoral theory of GALEN*. Now, for one who has got his training in a pathological laboratory, as every medical man has, and so has to see the changed condition of organs of a person dying of a particular disease, either macroscopically or microscopically, as Bright's disease or heart disease etc., for him to imagine that mental condition of a patient has got any influence in making the diseased organ function normally, is unthinkable. But, many close observers of events must have opportunities to see how, in spite of our worst prognostication, a man with all the valves of his heart leaking, or his kidney damaged as evidenced by examination of urine, showing albumen and casts (granular and fatty) in any amount, or a man teeming with microfilaria in his blood, is functioning throughout his allotted span of life, like a normal man. Then one must admit that, in spite of damaged organ or presence of parasites in his system, disease may not occur, the patient being in balanced physiologic state. Similarly, close observers of events cannot help seeing a large number of persons, who have got their lungs damaged or portion altogether destroyed by tuberculosis showing well marked cavities, functioning like a normal person, during a span of life extending to so much as quarter of a century or more, in spite of our worst prognostication. In these cases, it can be surmised that one of the contributory factors, but not the whole, is favourable mental condition.

We see also the other side of the shield, namely unfavourable mental condition producing disease. For example, a man carrying on his function in a normal way, becoming suddenly financially ruined or getting bereavement in his family, is attacked by consumption. The onset coincides with the occurrence—it cannot be said that the germ got entrance into the system, at the time of the collapse of his fortune or at the time of his bereavement. The disease was there, but it could not make a headway, due to favourable mental condition. So, a medical man must admit that, in spite of his training in the pathological laboratory, there are other factors besides the pathological entity, to explain the causation of what we term 'disease', or abnormal physiological function or dysfunction of the diseased organ or organs of

* It is necessary to remind the reader, that even now, Ayurvedic and Unani systems of Medicine teach that disease has got its origin in different humors of the body and not in diseased organ or organs.

the body *. So we see, now-a-days, eminent men in charge of sanatoria and having good opportunity for studying tuberculosis there, emphasizing in their treatises on tuberculosis that one of the causes why sanatorium plays its part in helping the healing of tuberculosis, is the hopeful atmosphere which prevails among the inmates as well as among the officers employed in the sanatorium. So much importance has been placed on the mental factor, that a sanatorium doctor, an author of several treatises on tuberculosis, states that a physician, to be successful in treating a case of tuberculosis, must play in dual capacity *i.e.* he must play the doctor as well as a friend of the patient, allaying and soothing his mental condition. This mental factor did not loom very large in my mind in the early days of my practice of tuberculosis; so I could not understand fully the drift of a lecture delivered on the subject of 'Sanatorium' to the medical profession in the hall of the Asiatic Society, a few years before the Great War, by a medical man, after visiting most of the sanatoria of Europe and America. He delineated in his lecture the working principles of sanatoria in detail which, he said, were nearly the same in all the sanatoria. But some how or other, the success which attended the Nordach Sanatorium under WALTHER was out of proportion from that of other sanatoria. He tried to explain that this was due to the infinite care which WALTHER used to take in improving the mental condition of his patient, by taking every care in studying him. I had since occasion to see the action of this mental condition; one case which made a deep impression on my mind in my early days regarding this factor is given below.

An elderly lady, suffering from ordinary subacute lung tuberculosis, with abundant T.B. in her sputum having reached a stage, which was

* This point is best illustrated by the following three quotations, two from one of the Annual Reports of Rockefeller Foundation and the third from Pottenger's Treatise on Tuberculosis.

(1) "The behavior of a living organism presents some features that appear to belong largely to the broad realm of physiology. The growth of knowledge, however, continuously emphasizes the interdependence of these two aspects; and the constant interplay, if not the actual identity, of the psychical and somatic aspects of behavior becomes every day more evident."

(2) "Professor W. B. Cannon of Harvard developed his now famous 'Emergency Theory' to explain the interaction which occurs between the sympathetic nervous system and the adrenal gland, when the subject (a cat) is caused to experience pain, fear, or anger (by, for example, the presence of a barking dog). Under the influence of this emotional experience, and to meet this 'Emergency', a chemical substance called Epinephrine is secreted by the adrenal glands and is automatically discharged into the circulation and serves to reinforce the activity of the sympathetic nervous system whereby the body is placed in condition for activity to meet in the demand of the occurrence."

(3) In speaking of the value of mental rest in addition to physical rest in tuberculosis, Pottenger writes as follows: "In considering rest for the organism, one should bear in mind the necessity of maintaining psychical equilibrium if he will protect the physical machine to the fullest extent, for a tremendous wear and tear can be forced upon the body by emotions. It is only necessary to analyse the changes which are brought about under condition of fright or those brought about by an anticipation of Here, the heart beats rapidly, respiration quickens, blood pressure rises, the muscles stiffen and liver gives out glycogen, before a motion towards escape or movement in the race has been executed."

thought by her previous medical adviser to be the final stage, was kept on my advice on the roof of a two storied house, confined to bed, by which she became free from fever. She started improving rapidly and this period was contemporaneous with the period when I started giving her a course of tuberculin. On getting news of one of her sisters suffering from erysipelas, hæmoptysis took place. She rallied for a time, on getting the news of her death; later on, she started getting fever, which remained unchecked up to her death.

Since then, innumerable instances of favourable mental condition in healing and unfavourable condition in retarding the healing action, have been seen by me. It is very difficult to describe this subtle factor, as there is no way of gauging it. Besides, in analysing the favourable action, which takes place in a particular case, where rest followed by tuberculin has got its action too, it is difficult to make out how much the mental factor has got its share in shaping the course of events in a particular case. Anyhow, I am relating a few cases, where I thought the mental factor had contributed its part in healing, besides the factor of rest and tuberculin.

First, a case is related here to show adverse mental condition, which made an impression on his system, as indicated by loss of weight but no fever occurred; fortunately, this adverse mental condition having been removed, he recovered.

S. 127. A young man, aged 22, an inhabitant of Khulna, started getting slow fever and cough, for over three months, at the end of which, he began bringing out huge quantity of blood from his lungs accompanied by high fever. Unrelieved by treatment in his village, he came to Calcutta. He was brought to my clinic by his uncle, who himself was a tubercular patient, successfully treated by me 14 years previously. A definite lesion was found in his right apex. He was so weak then that he fainted at the time of examination. He was taken charge of, by his father-in-law, who had a house in Calcutta and who agreed to keep him perfectly at rest in his house and nurse him and that he would report to me periodically the condition of his son-in-law. The fever stopped after 4 weeks' rest. Then a course of tuberculin was started, first when he was lying down in bed and later on as an ambulant case. During this period, he gained from 107 to 121 lbs. But due to some misunderstanding between him and his father-in-law, he had to shift for himself and live in a mess and due to pecuniary trouble, he had to join his post as a printer in a printing press, where he had to work for 11 hours a day. All this time, he was free from fever, chest showed no physical sign and he was symptomless except slight cough. One day, one of his neighbours in his native village in Khulna, coming to see him at Calcutta, told the members of his mess and the Manager, that he was a phthisical case. He was turned out of the mess, after which he lost 8 lbs., in weight. Since then, he got 6 months' leave from his office and had gone to his village, where he had got peace of mind and physical rest. He has started improving again.

Here below, two cases are given to show the effect of favourable mental condition:—

1. Case S. 88 (Ghatal boy). In 1932, a young man aged 20 was brought to my clinic, by a medical man, suffering from slow fever and cough and emaciation for over three months. I came to know that he was working as a salesman in the shop of a scent merchant in Calcutta, getting not more than 10 to 12 rupees a month and that he was allowed to occupy a room of the proprietor on account of his straitened circumstances, his old father and mother living in a village in Midnapore depending on his income for their sustenance. For food, he used to go to a hotel situated nearby. Examination of his lung showed a lesion in the left base. As there was no sputum available, Von Pirquet's test was done. He was asked to take rest and was assured of speedy recovery, of which he saw evidence in others, while attending my clinic. As he had to come to my clinic for the test being done on the third day of his first visit to me and had to go to a hotel to take his food twice daily, perfect rest was not possible. But for reasons, which have remained unexplainable to me up to now, the fever stopped within 4 days of my first seeing him. Whether it was due to the imperfect rest or the absorption of tuberculin in the system, from the Von Pirquet test or the mental factor, it is very difficult to analyse. I gave him a course of tuberculin as an ambulant case after he got rid of his fever. The first weight was 101 lbs., the next week, it was so much as 108 lbs. and the next was 114 lbs. till it reached 122 lbs. within 5 months. He is now a healed case. Saw him perfectly healthy on 1.11.35.

Saw him again on 25-4-37. He said that he had got diarrhoea, and marked loss of appetite, which he attributed to relapse of his old complaint. But he had no cough—no fever, examination of his chest showed no lesion. Weight 116 lbs., which increased to 120 lbs. after a week, without having any treatment. Saw him on 1-2-40, perfectly healthy.

2. Case No. 68 (Mitter Institution). This is a case of open tuberculosis of lung. After a year's suffering from the complaint, for which she went for a change and got the so-called Specific Calcium Chloride and Solganal treatment without getting any benefit, having lost 12 lbs., she was first seen by me in 1929 in her father's house, confined to bed. There was a history of 3 of her relatives—one brother and two sisters—having died of tuberculosis. As, at the time when I saw her first, she was almost feverless and very little cough and chest signs to be found in the left apex were not easily detectable, I assured her, with all the emphasis I could command, that she was not suffering from tuberculosis at all and that as she was emaciated, a course of injection to fatten her up was to be given by me, and that for this, she must remain at rest and keep her windows open. I took her weight at that time. It was 79 lbs. The next week, it was 84 lbs. I cannot explain this remarkable increase in weight in an open case of tuberculosis, showing any number of tubercle bacilli in her sputum and who was slowly going down hill, by one injection of tuberculin except the

mental factor. Since then, her weight has gone up to 120 lbs., within 6 months and has remained so up to now (11 years, 1940).

Now, it is necessary to discuss, if this hopeful mental condition be a contributory factor in the healing of tuberculosis, whether this condition can be had more in a sanatorium as has been stated in some of the treatises on the subject, than in the homes of the patients. One of the reasons which have been put forward by one of the sanatorium doctors in claiming this for sanatorium is that there prevails more favourable mental condition than in the patient's home; because, all the inmates of the former being patients, they help each other by giving encouragement, by discussing the remedies of their complaints and besides, all being confined to bed and none working, this helps in a better way to this sense of comfort than when all the members of a household, go out to work, as in the latter case where the patient is the only person without any work, and also the regular visit of the doctor in the former helps to keep up their spirit. Now, any one with a grain of common sense, will say that these very conditions prevalent in a sanatorium will damp the spirit of any patient, far from keeping it up. In the home, he being the only person who is ill, and who may not have visible symptoms all the time, forgets his disease which helps more to keep up his spirit than constant talks about his complaints.

Lastly, about this spirit of hopefulness which is claimed as prevailing among the sanatorium men and which, they say, is a great asset, it is necessary to state in refutation of their claim that, if most of the patients are not getting well, this spirit of hopefulness will not prevail. This pre-supposes that a large number of patients in a sanatorium doctors—being "collapse conscious" as asserted by one of them—are resorting more and more than ever, to mechanical treatment instead of sanatorium treatment of rest and open air, it shows the want of this hopefulness in these institutions due to their want of confidence in sanatorium methods.

Nowhere is the effect of favourable or unfavourable mental condition in the course of tuberculosis seen in more remarkable light than in the case of handling of serious hæmoptysis of tubercular origin. This, if unchecked, may mean instantaneous death, but which if checked, means gaining of a good amount of time for treating the patient on rational lines, which may bring him to perfect health. The following quotation from POTTENGER is given in support of this contention:—

"The treatment of hæmorrhage must vary according to the nervous temperament of patients and according to the temperaments of the friends and relatives, who may be present to help or harm the patient."

"Nervousness should be controlled and fear should be allayed, for their influence on the circulation and respiration is of the same nature as physical exertion."

As the writer's method of treatment of hæmoptysis, be it small

in amount or extensive, is based more on soothing the mental condition of not only of the patient but of his relatives, than on exhibition of any so called specific drug for stoppage of hæmoptysis, a method which he has been carrying on for over 40 years with marked success, he sees no occasion to change it in favour of any new drug which is being discovered continuously as specific against hæmoptysis, one being discarded after the other—as he finds the success attending the method he follows is more uniform than the result of those who resort to the so-called specific treatment including mechanical treatment namely A. P. which has been added since, by many medical men to their armoury for checking hæmoptysis finding their so-called specific drugs to be of no avail. If hæmoptysis is checked—whether by the action of the medical man or naturally it is difficult to decide—high fever with flaring up of the main disease takes place of which he has to see numerous instances.

Recital of one case where this factor of mental rest was not applied, the practitioner depending entirely on the so-called specific treatment, will show not only the futility of the method, but its dangerous aspect bringing the patient to death's door in an incredibly short time. It is given as a type of numerous such cases, which are occurring here due to the prevailing mania for mechanical treatment or "collapse consciousness" as is termed by a sanatorium doctor.

A young man aged 18, enjoying robust health, got an attack of influenza shown by cough and slight fever. As a precaution against tuberculosis, a dose of Calcium Chloride was given intravenously by the village medical practitioner. This was followed by high fever. A second dose was given, the fever being explained away as reactionary fever. Severe hæmoptysis followed, to prevent which stronger dose of Calcium Chloride were given. Physical signs appeared in the right apex with appearance of T. B. in sputum. The patient with high fever was dragged to the X-ray room for talking a film—it being considered as an essential part of the treatment. A tuberculosis specialist was sent for. A.P. was started—refills were given at intervals of a week or so, the specialist writing in the case sheet, carefully the intrathoracic pressure and other details, the high fever and signs of prostration and difficulty of breathing being of no concern. The stoppage of hæmoptysis was taken as a triumph of the treatment. The high fever and incessant cough, which prostrated the patient, were of no account. When I saw the patient at the end of this treatment, he was panting for breath. The right side being full of air, no physical sign could be elicited. A week after, the relatives came to me stating that he was pulseless and dying; the whole episode, from starting of the complaint which was in the beginning like an ordinary attack of influenza to death, did not take more than six months. To account for this galloping course of the disease, it is necessary to state that there was no family infection of tuberculosis.

Rationale of Ayurvedic Treatment in Pulmonary Tuberculosis

BY

L. A. Ravi Varma, M.B. & C.M.,

Trivandrum

To understand the rationale of the methods of treatment, advocated in Ayurveda, it is necessary to have some idea of the principles of pathology as envisaged in that system. That Ayurveda recognised the infectious nature of pulmonary tuberculosis is evident from such passages as:—

प्रसङ्गाद् गात्रसंस्पर्शान्निःश्वासात् सहभोजनात् ।

सहशय्यासनाच्चापि वस्त्रमाल्यानुलेपनात् ॥

कुष्ठं ज्वरश्च शोषश्च नेत्राभिप्यन्द एव च ।

औपसर्गिकरोगाश्च सङ्क्रामन्ति नरान्नरम् ॥

(Susr : Nid : vi, 33 & 34).

"Superimposed disease, leprosy and cutaneous diseases, fevers, consumption, ophthalmias etc., pass from man to man by means of sexual contact (very close contact), breath, eating from the same plate, sleeping together, sitting together, by the use of common clothes, garlands etc."

It is specially interesting to note that they recognised breath as a source of infection in certain class of diseases as tuberculosis. As the term 'consumption' in English, *Sosa*, in Sanskrit, stands for pulmonary tuberculosis, SUSRUTA defines *Sosa* as:—

संशोषणाद् रसादीनां शोष इत्यभिधीयते ।

क्रियाक्षयकरत्वाच्च क्षय इत्युच्यते पुनः ॥

राजश्चन्द्रमसो यस्मादभूदेष क्लामयः ।

तस्मात् तं राजयक्ष्मेति केचिदाहुर्मनीषिणः ॥

(Susr : U : xli, 4 & 5).

CHARAKA's description of the signs and symptoms of this disease leaves no doubt as to its identity. He describes (Char : Sosa nidana, vi, 24) an advanced stage of the disease as having fullness of head (शिरसः प्रतिपूरणम्), cough (कासः), difficult or asthmatic breathing (श्वासः), loss of voice (स्वरभेदः), profuse expectoration (श्लेष्मणश्छर्दनं), blood spitting (शोणितघ्ननम्), pain on sides of chest (पार्श्वसरोजनम्), pain referred

to shoulders (अंसावमर्दः), fever (ज्वरः), as well as diarrhoea and anorexia (तथा अतीसारः अरोचक इति), it is interesting to note that they recognised a tubercular diarrhoea, as is evident from statements such as वर्चो मंदं गुदे स्थितः “when it affects the rectum, diarrhoea results” (Char: Cik: viii, 15).

Though Ayurveda recognised infecting agents and infective diseases full well, it should be clearly understood that according to that system, these infecting agents were not the *fundamental cause* of any disease. That the ground must be ready, and the best of seeds on a barren soil cannot thrive, was their contention. Hence, to the Ayurvedic, the fundamental cause of disease was something else, infection being only a superimposed factor. To the Ayurvedic, an imbalance between the three primary physiological factors is, every time, the fundamental cause of disease. This imbalance renders the body susceptible to infection. Ayurveda recognises the existence of these three factors in all living bodies, their perfect balance producing the condition known as health. These factors are: (i) Vata, nerve-function—including autonomous, (ii) Pitta, secretory functions—including internal secretions—and (iii) Sleshma, connective tissue functions—including those of blood, serum etc. These three factors, known as Tridoshas are so inter-linked that any defect in one will tell upon the normal working of the rest, to a greater or less extent, according to the nature and degree of the defect. A perfectly balanced condition of the three factors constitutes health and any imbalance becomes the fundamental cause of ill-health or disease. Infective agents are powerless to produce disease unless there is already a pre-existing imbalance of these three factors. Plenty of virulent pneumococci may be present in the throats of many in perfect health; one can be a cholera carrier without being a victim of the disease: such and similar facts tend to show that the contention of Ayurveda is logical and sensible. This truth is now recognised by European system as well. They assign such immunities to certain indeterminate factors as ‘natural resistance’ and ‘vitality’—terms which carry little concrete sense even to those who freely use them. On the other hand, ancient Indians have tried to explain the phenomena in a more rational manner and with a deeper and clearer understanding.

When once this Ayurvedic contention is accepted, the role of infecting agents becomes a secondary or subordinate factor, however important that factor be. It then becomes the business of the physician to find out the nature of the primary imbalance that permitted the disease to manifest, and to institute means and measures to restore the lost balance and effect a cure. To this, of course, is added symptomatic treatment to reduce pain and distress. This then, is the fundamental principle underlying Ayurvedic treatment.

Bearing this in mind, we shall now consider their measures of treatment in pulmonary tuberculosis or ‘Rajayakshma’. We have

already noted the cardinal symptoms in a well established stage as enumerated in Ayurveda. Besides the established stage, they recognised a premonitory stage, ‘Purvarupa’, as well as an early stage, ‘Rogotpatti’. The ætiological factors that tend to produce this disease, are various forms of reckless living and consequent lowering of vitality. The fundamental derangement is one that affects the connective tissue function (Sleshma); then Vata is affected and, as is inevitable, at a later stage all the three get affected (Sanni-pata). Their ætiology is:—

व्यवायशोकस्त्राविर्यव्यायामाध्वोपवासतः ।

वर्णोरक्षतपीडाभ्यां शोषानन्ये वदन्ति हि ॥

(Sus : Utt : xli, 16)

“(Sexual excesses, grief, extreme old age, heavy exertions, long trampings, starvation, wounds and injuries to chest and lungs etc., predispose for consumption)”. These causes help to excite all the three doshas, and Vata and Sleshma in particular, causing abnormal contraction or dilatation of all srotas (blood vessels as well as bronchioles) giving rise to symptoms.

मुखानि स्रोतसां रुध्वा तथैवातिविवृत्य च ।

.... जनयेद्भूदान् ॥

(Hr : Nid : v, 6)

The premonitory signs are, lividity (प्रतिश्याव), sneezing and cough (क्षत्र), expectoration (प्रसेक), sweet taste in the mouth (मुस्तमाधुर्यम्), general lassitude (मादः), anorexia (अरुचिः), weakness even when well-fed (अश्रतोऽपि बलक्षयः), Hr : Nid : v, 7 e. Later on, regular classical symptoms develop, when the disease is fully formed.

Their remedial measures may be broadly classed under two heads, general and special; general, calculated to improve vitality and general health (Brhmana prayogas) and special to restore the lost balance and cure the disease. They achieved improvement in general health by hygienic and dietetic measures. Among hygienic measures, fresh air without moisture and draught, bright sunlight and pleasant surroundings and associations were prominent.

उत्तरो मारुतःस्निग्धो मृदुर्मधुर एव च ।

कषायानुरसः शीतो दोषाणां चाप्रकोपनः ॥

तस्माच्च प्रकृतिस्थानां क्लेदनो बलवर्धनः ।

क्षीणक्षयविषातानां विशेषेण तु पूजितः ॥

(Sus : Sutr : xx, 30 & 31)

In most parts of India, eastern, western or southern breezes are sea breezes and hence are moisture-laden; further they are often in the shape of draughts. Hence the recommendation of northern breeze. What they have recommended is plenty of dry, cool, fresh air without draughts; this was particularly advised for tubercular patients as will be evident from the text quoted above. Similarly, injunctions like 'आरोग्यं मास्करादिच्छेत्' shows that they recognised the wholesome and curative properties of sunlight. They have advocated cleanliness, pleasant surroundings, good nourishing and easily digestible foods etc, as measures for the improvement of general health.

शुद्धकोष्ठस्य युज्यते विधिं बृंहणदीपनम् ।
हृद्यानि चान्नपानानि वातघ्नानि लघूनि च ॥
शालिषष्टिकगोधूमयवमुद्गं समोषितम् ।
आजं क्षीरं घृतं मांसं कव्यान्मांसं च शोषजित् ॥
गौरसर्षपकल्केन स्नानोद्यौषधिभिश्च सः ।
स्नायादतुसुखैस्तोयैर्जीवनीयोपसाधितैः ॥
गन्धमाल्यादिकं भूषामलक्ष्मीनाशनीं भजेत् ।
सुहृदां दर्शनं गीतवादित्रोत्सवसंश्रुतिः ॥
वस्तयः क्षीरसर्पाणि मधुमांससुशीलता ।

(Hr: Cik: v, 4-6 & 81-83).

"After the alimentary tract is rendered clean, measures should be taken to improve digestive function and patient fed well to ensure putting on weight. Easily digestible, non-stimulating ('vataghñani') and appetising foods and drinks should be given such as, rice, wheat, barley, goat's milk, ghee, meat etc. Bath with mustard or other medicaments added, and at a temperature suited to the prevailing climatic conditions, is to be used. Flowers etc. calculated to enhance a sense of well being are useful. So are also company of friends and pleasing enjoyments as music etc. Sensible use of milk, ghee, wine etc. are also wholesome." (Free translation). SUSRUTA recommends cleaning of mouth and teeth twice a day. The value given to pleasant surroundings etc. to avoid mental depression is particularly noteworthy.

In the treatment of tuberculosis, Ayurveda has a special word in favour of goat's milk.

गन्धतुल्यगुणं त्वाजं विशेषात् शोषिणां हितम् ।

(Sus: Sutra: xlv, 51).

In the case of all milk they recommend fresh raw milk as the best; they understood that over-cooking made it indigestible.

भवेद् गरीयोऽतिश्रुतं धारोष्णममृतोपमम् ।

(Hr. Sutr: v, 29).

Butter and ghee were also largely used in the dietary of consumptives, and butter was particularly mentioned as of great use.

नवनीतं क्षयकासश्वासत्रणशोषार्शोऽर्दितापहम् ।

Butter and ghee from goat's milk was considered particularly useful in consumption.

आजं घृतं दीपनीयं चक्षुष्यं बलवर्धनम् ।

कासे श्वासे क्षये चापि पथ्यं ॥

(Sus: Sutr: xlv, 98.)

In this connection, I may mention that I have found goat's milk markedly superior to cow's milk in keratomalacia cases, a Vitamin-A. deficiency disease. It is also much better tolerated in advanced cases with marked gastro-intestinal disturbances. This means that it is of greater value than cow's milk in tubercular diseases as well.

Meats of various kinds and meat juices (मांसरसः) are also strongly advocated in the dietary of consumptives; so are legumes, wheat etc. Good, wholesome old wine is also recommended. (पिबेच्च सुतरां मद्यं जीर्णं Hr: Cik: v, 12). Besides these dietetic and general measures for body-building and improvement of health and weight, they had medicinal measures calculated to cure the condition. They were using in one form or other, drugs like Allyum Sattivum (लशुनम्), aromatics as Piper Longum etc. whose volatile oils during excretion by the lungs, acted as a stimulant and antiseptic to that tissue and the like. Certain antiseptics and volatile aromatics were used in the form of cigarettes for their direct local action on lungs and bronchii. We shall analyse one such formula to understand their therapeutic effect. One cigarette formula contains, Di-Sulphide of Arsenic (मनःशिल), Bassia Latifolia (मधूक), Valeriana Jatamamsi (मांसी), Cyprus Rotunda (मुस्ता), and Balanitis Roxburgii (इङ्गुदीत्वक्). Therapeutic properties of these drugs are:—

Di-Sulphide of Arsenic—Antiseptic in the form of oxide of Arsenic when burnt as cigarette.

Bassia Latifolia—(Dried juice of bark is the part used.) It contains a resinous substance acting as a mild antiseptic and stimulant as Benzoin.

Valeriana Jatamamsi—Same as Val: Office: anodyne, anti-spasmodic and sedative.

Cyprus Rotunda—Rubefacient effect; promotes better blood circulation locally.

Balanitis Roxburgi—Bark: has an expectorant action.

Total effect of the smoke will, therefore, be as a stimulant expectorant, with a sedative and antiseptic action on lungs and air-passages.

Internally, as an aid to cure they exhibited calcined pearl and calcined coral. In other words they were giving calcium in the form of oxide (?). We now know that calcium helps to cure the disease by hastening calcification of the affected foci.

कफपित्तक्षयध्वंसी कासश्वासाम्निमान्यनुत् ।
पुष्टिदं वृष्यमायुष्यं दाहघ्नं मौक्तिकं मतम् ॥
क्षयपित्तासकासघ्नं विद्रुमम् ।

(R : T : S : Pur : iv, 16 & 19).

Gold and its salts were also used for their antiseptic, alterative and tonic actions. Several Avalehas, having both medicinal and dietetic value, are largely used in consumption. We shall take two typical examples and analyse them to understand their properties. Aswagandhavaaleha :—

Aswagandha (Withania Somnifera)—contains an alkaloid, Somniferin, a good sedative.

Pippali (Piper Longum)—Volatile oil: pulmonary antiseptic, stimulant and carminative.

Ghee and Honey—Food and vitamin value.

Total effect will be that of a sedative expectorant with marked food and vitamin value.

Agastya-Rasayana, a well known preparation :—

Haritaki (Terminalia Chebula)—Laxative, astringent and alterative.

Yava (Hordeum Distichon)—Contains diastase besides nutritive factors; hence helps digestive function and improves nutrition.

Dasha-mula (ten roots)—Total action: diaphoretic, laxative, mild diuretic and expectorant.

Chitraka (Plumbago Zylanica)—Stomachic and expectorant.

Pippalimula (Piper Longum root)—Stomachic, expectorant and pulmonary antiseptic.

Apamarga (Achyranthus Aspera)—Contains large quantities of Pot. Carb. and hence helps to liquefy and expel mucus.

Sathi (Salvia Plebia)—Demulcent.

Kapikacchu (Macuna Pruriens)—Nervine tonic and aphrodisiac.

Samkhapuspi (Clitoria Ternata)—Demulcent.

Bharngi (Cleodendron Serratum)—Contains a bitter principle having a febrifuge and tonic action.

Gajapippali (Scindapus Officinalis)—Aromatic and stimulant.

Bala (Sida Cordifolia)—Febrifuge, tonic and demulcent.

Puskaramuli (Aplotaxia Auriculata ?)—Antispasmodic.

Pippali (Piper Longum)—see ante.

Ghee, oil, sugar and honey—Food and vitamin value.

Total effect of the preparation is, therefore, one of a mild laxative, stomachic and stimulant expectorant with a sedative and antiseptic action on respiratory organs, having also high nutritional and vitaminising values. Thus it helps to get rid of toxins (diaphoretic, diuretic and laxative values), acts as a febrifuge, liquefies mucus and helps expectoration, has an antiseptic and sedative action on lungs, promotes digestion and supplies vitamins and nutritive factors.

There are many such formulas of real worth and value.

These measures are augmented by hygienic and dietetic measures as have already been explained. It will thus be seen that the rationale, underlying the treatment of consumption as advocated in Ayurveda, is sound and scientific and is not inferior to the Western methods as far as it goes, i. e. if allowance is made for the absence of surgical measures as artificial pneumothorax, electrotherapy, etc. When comparing with modern forms, it should be remembered that the teachings elaborated in Ayurveda are at the least computation, some two thousand years old. The wonderfully accurate and scientific attitude of our forefathers command the highest respect of all thinking men. My studies make me bold to assert that careful research in Ayurveda can give much valuable help for the common weal of humanity, and I strongly recommend Indian Universities to take up the question in right earnest.

NOTICE

3rd All-India Obstetric & Gynaecological Congress

The 3rd All-India Obstetric & Gynaecological Congress will be held this year in Calcutta, from the 27th to the 30th December 1940, both days inclusive.

The subjects for discussion are:—(1) Anaemia of Pregnancy; (2) Functional Uterine Haemorrhage; and (3) Maternity & Child-Welfare.

For particulars, please apply to the Jt. Hony. Secretaries, The Bengal Obstetric & Gynaecological Society, 91B, Chittaranjan Avenue, Calcutta.

The XVII All-India Medical Conference, Vizagapatam, 1940.

(Scientific Section)

Dr. P. Kutumbiah, Chairman, Scientific Section, notifies as follows:—

In connection with the Scientific Section of the forthcoming 17th All-India Medical Conference at Vizagapatam, during the last week of December 1940, it is proposed to have symposiums in the following subjects, in addition to the reading of papers.

1. Surgery:—Surgical complications of Filariasis.
2. Medicine:—High Blood Pressure, Its Aetiology, Pathogenesis and Treatment.
3. Obstetrics:—Maternal Injuries of Child Birth.
4. Venereal Diseases:—Modern Treatment of Gonorrhoea.

The names of the openers of discussion on the above subjects will be announced in due course. All those who propose to attend the Conference are requested to take part in the discussion and make the symposiums a complete success.

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The subject for a symposium is Trachoma. Members who desire to read papers before the Conference are kindly requested to send a copy of their paper with a short summary, to one of the Secretaries before the 30th November. At past conferences, it had been found difficult to get the final programme of papers printed in time as the titles of the papers had not reached the Secretaries early. Kindly, therefore, send in your papers early. It is hoped that many of the members will contribute papers and make the Conference a success.

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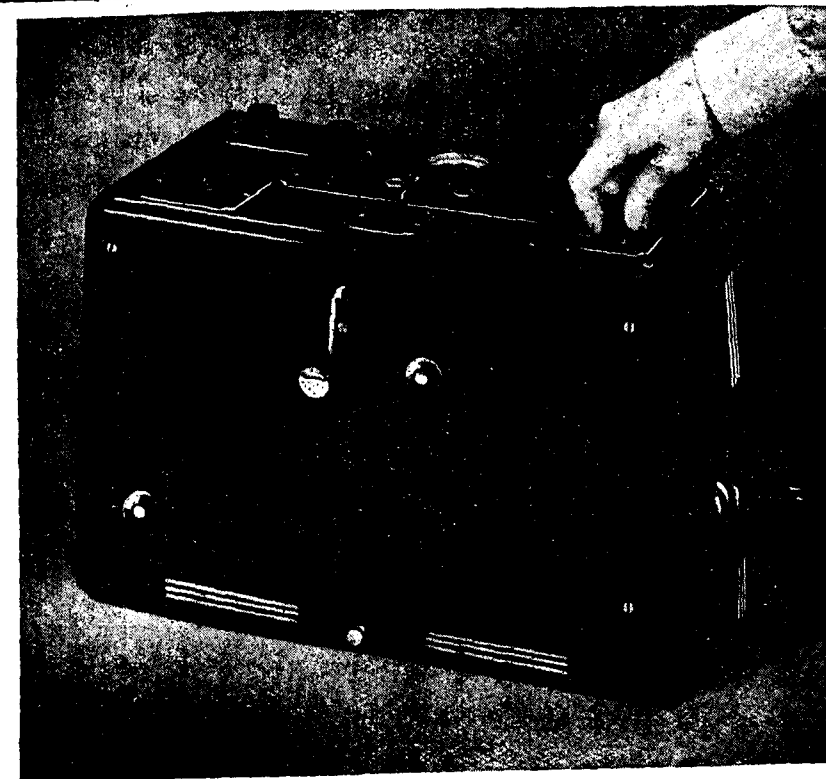
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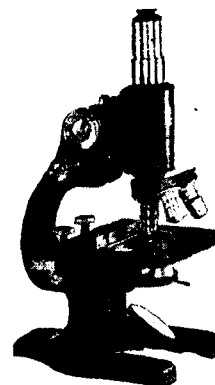
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Contributions are invited from the medical profession in India and abroad in the form of original articles, clinical lectures, medical society addresses, reports of interesting cases, condensed extracts of useful articles appearing in other journals with or without comment, practical hints and recipes, experiences with new preparations and inventions, vital statistics, therapeutic notes, communications etc.

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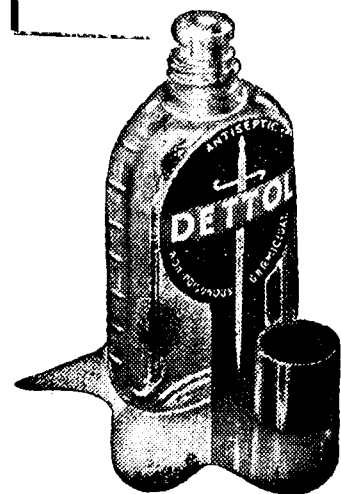
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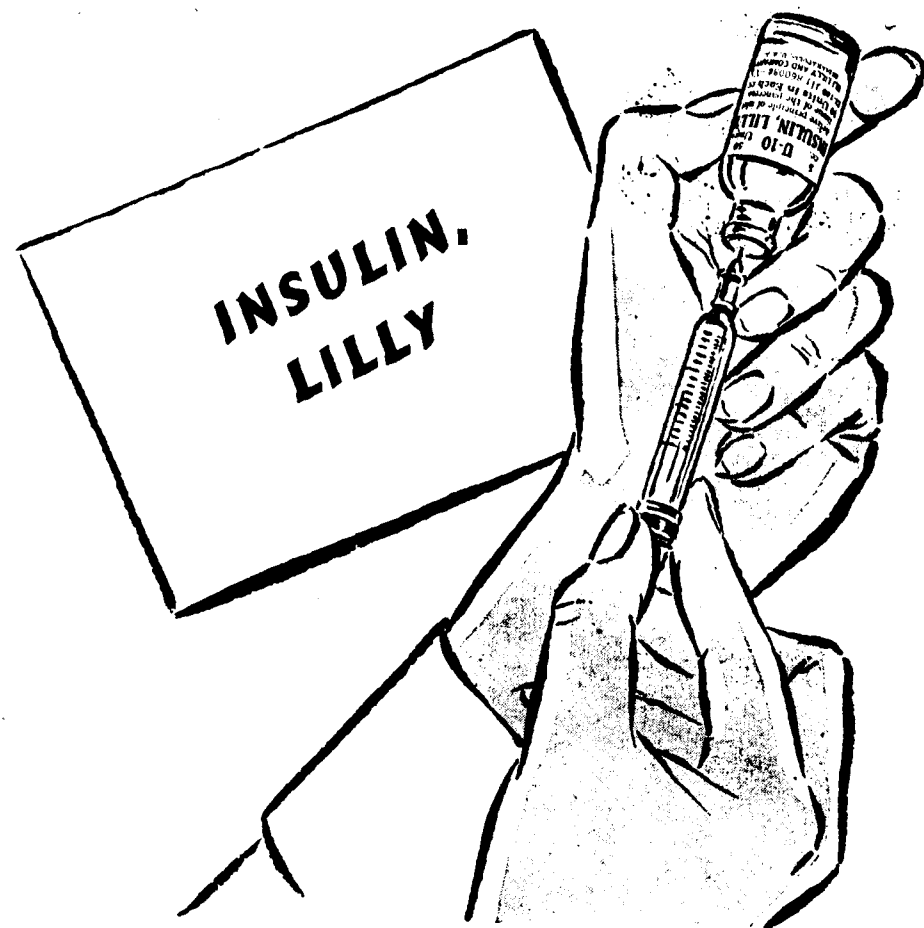
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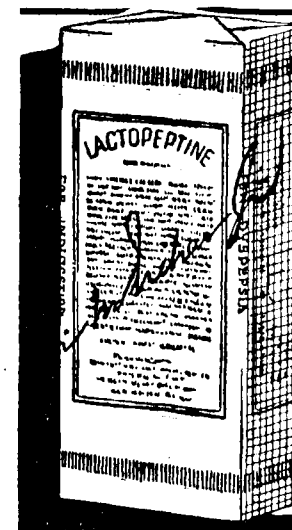
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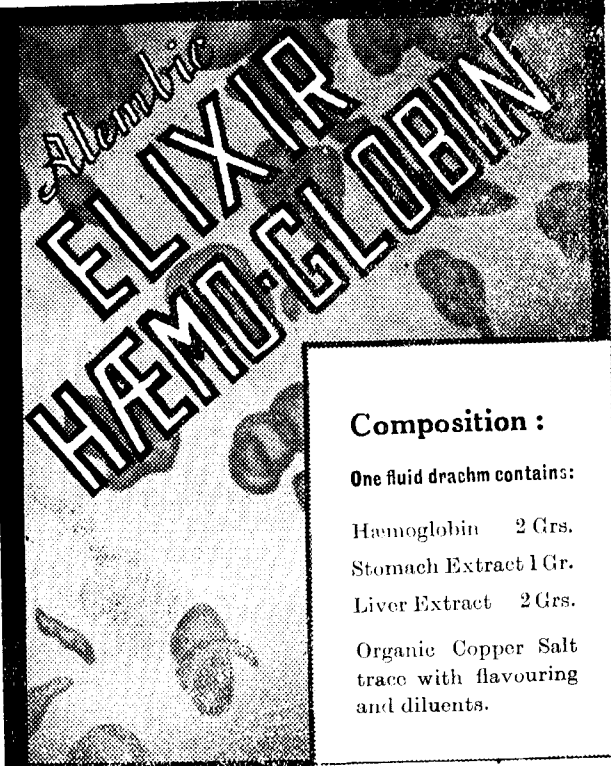
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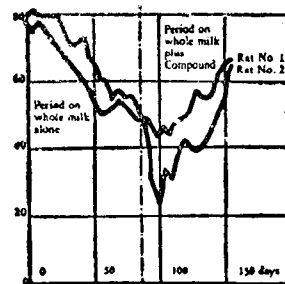
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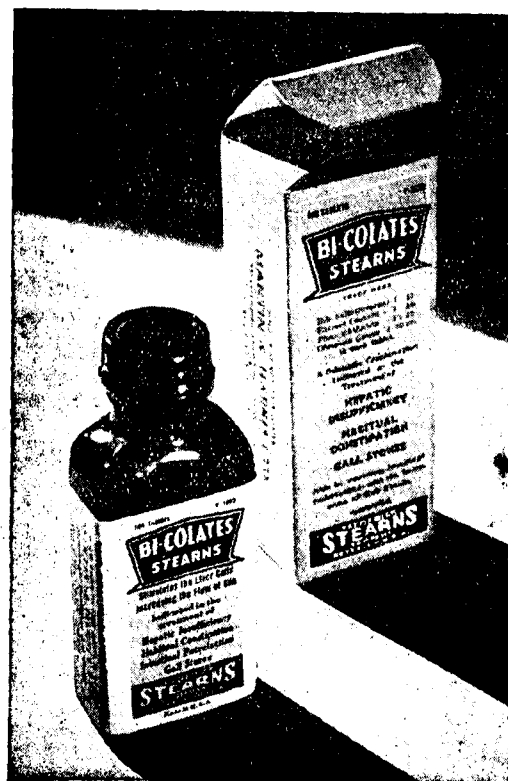
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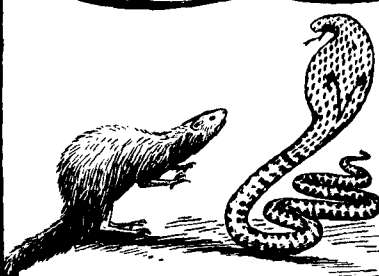
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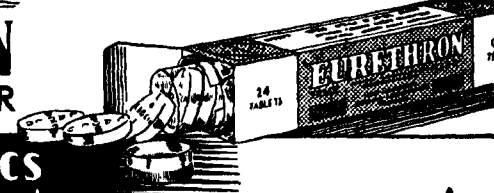
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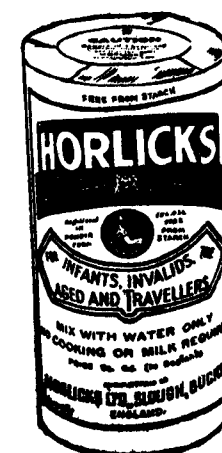
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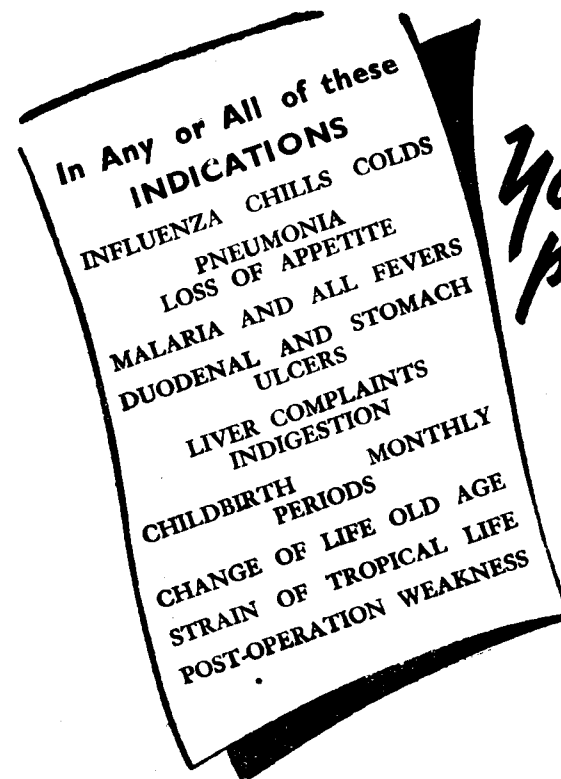
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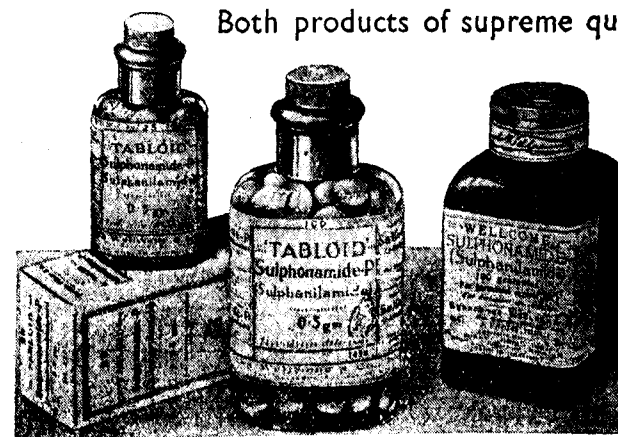
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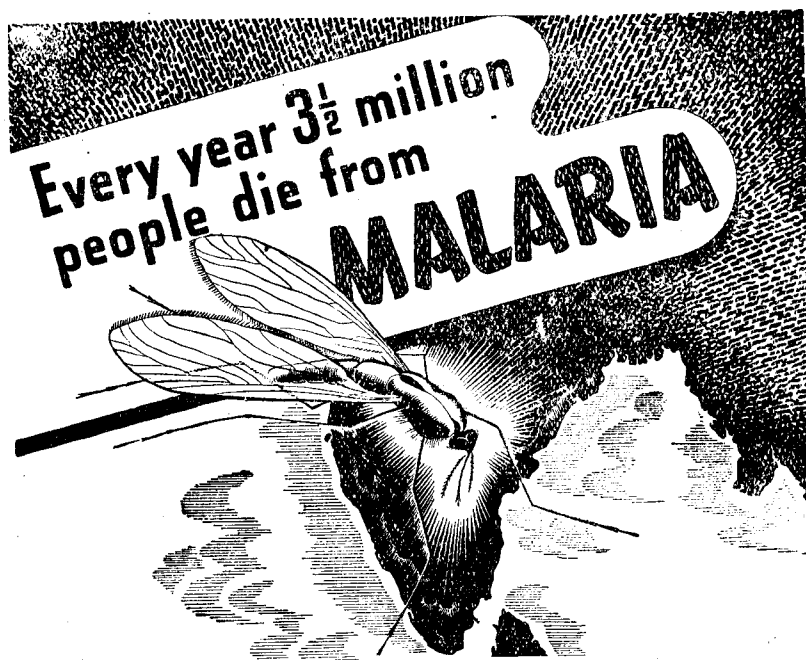


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Vol. 37.

DECEMBER, 1940.

No. 12.

ORIGINAL ARTICLES

Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna*

BY

M. G. Kini, M.C., M.B., M.Ch. (ORTH.), F.R.C.S. (EDIN.),
Surgeon, King George Hospital, Vizagapatam, (S. India.)

OUT of 330 injuries of the elbow seen and treated, there were 19 cases of fractures of the upper third of the ulna, of which 10 cases were associated with dislocation of the head of the radius. There were 2 cases of congenital dislocation of the head of the radius in addition. One of them was found in a European male, aged 48 years, who sought advice for stricture of the rectum. On examination, it was found there was marked concavity just below the olecranon process on the dorsal aspect of the forearm and the head of the radius was found to be dislocated in front of the elbow. Movements of the elbow in some aspects were more than normal. He had hyper-extension of the elbow causing a sort of cubitus recurvatum and a slight limitation of flexion by about 10°. Pronation and supination were found to be normal. (See pictures H, H-1, H-2, and H-3.)

McFARLAND⁵, who described this condition, found in these cases the head of the radius to be dome-shaped instead of being flattened. At operation, he found the radius too long, the head outside the capsule and absence of orbicular ligament and lesser coronoid fossa. On radiographic examination, he found an anterior curve in the posterior outline of the ulna starting at the level of the coronoid fossa, which is contrary to the slightly posterior curve normally present at this level. This case resembled the description given by him in the

* Specially contributed to 'The Antiseptic'.

radiographic picture and no operation was undertaken as the functional result was very good and he sought advice for some other complaint. In the second case, it was found in a man aged 35 years with a congenital amputation of the forearm at the proximal and middle third. On X-ray examination, it showed a congenital dislocation of the head of the radius. (*See pictures G and G-1.*) He accompanied his daughter with a congenital recto-vaginal fistula and he was examined as a congenital surgical curiosity. Pure dislocations of the head of the radius do not occur. In cases where there was a dislocation of the head of the radius, there was always a fracture of the upper third of the ulna, but the reverse was not found true. Out of 19 cases of fracture of the upper third of the ulna, 9 cases had no dislocation. MONTEGGIA was the first to describe this fracture in 1812. (As quoted by OSMOND CLARKE⁶) He stated that in fractures of the upper third of the ulna, there was associated dislocation of the head of the radius and that it was due to direct violence causing a fracture of the upper third of the ulna with bowing forwards of the fracture and thus levering out the head of the radius. In the series under review, there was only one case which gave a definite history of direct violence. The violence was so great that, in addition to the fracture of the upper third of the ulna and dislocation of the head of the radius, it caused contusion of the radial nerve causing radial paralysis (*See pictures A, A-1, and A-2.*) The following were the causes of the fractures found associated with or without dislocation of head of radius.

History of a blow.	...	1
„ fall from a height.	...	13
„ slipping and a fall.	...	2
„ fall from a cycle.	...	1
„ railway accident.	...	1
„ fall from parallel bar.	...	1
Congenital dislocations.	...	2
	—	
Total	...	21 cases.
	—	

Out of these 21 cases, 9 were on the right side, 12 were on the left side and 12 were males and 9 females. From a perusal of the causes of fractures mentioned above, it becomes evident that in the majority of the cases, the history given was a fall and it was difficult to get an accurate statement as to the actual cause of the fracture. The dislocation did not occur in green-stick fractures of the upper third of the ulna unless there was marked bowing forwards of fragments or great displacement of fragments, and probably such fractures were due to greater violence. In the series, the youngest was 5 years old and the oldest was 55 years and there were 2 cases of fractures of the neck of the radius associated with fractures of the upper third of the ulna. (*Vide Cases No. 9 and 13.*) (*See pictures E and F.*) There was one case of a posterior and lateral dislocation of the head of the radius with fracture of the middle of the shaft of the ulna: result of a fall from the roof of his house. (KINI⁴)

Pathological Anatomy.—Dislocations of the head of the radius do not usually occur in cases of fracture of upper third of ulna of green-stick variety without remarkable bowing forwards of the bone or in cases of complete fracture without displacement of fragments. In cases associated with dislocation of the head of the radius, the bowing forwards of the fragments or the displacement of the fragments is a remarkable feature. At operation in cases of dislocation, it was found that the orbicular ligament was torn along with the anterior part of the capsule. On the cadaver, it has been found that if the orbicular and lateral ligaments are torn along with the capsule, the head of the radius becomes very wobbly and this is what happens in cases of this type of dislocation. In such cases, reduction is easy but maintenance becomes difficult. The biceps is found remarkably shortened and in marked spasm along with pronator radii teres.

Signs and Symptoms.—The signs and symptoms of this fracture are the same as of any other fractures anywhere in the body, but in cases where it is associated with dislocation, marked deformity will be found as shown in pictures M, M-1, and N. On physical examination, in addition to finding the tenderness at the junction of the upper and middle thirds of the ulna, a lump would be found in front of the elbow and, on trying to rotate the head of the radius, there is marked spasm and pain in front of the elbow and the head could be found in its abnormal position if the swelling is not very great. It sometimes happens that the fracture of the upper third of the ulna is diagnosed and the dislocation is overlooked and has caused serious disability in some cases, while in other cases, has resulted in slight functional disability, associated with marked deformity giving an ugly appearance to arm (*See pictures M and M-1.*) It is, therefore, necessary to remember in cases of fractures of the upper third of the ulna of the associated dislocation of the head of the radius. In cases associated with fractures of the neck of the radius, the displacement of fragments in the upper third of the ulna was not remarkable. It is always necessary to confirm the clinical diagnosis by good radiological pictures (antero-posterior and lateral views) and it is very necessary to include the elbow also in the radiographic pictures: failure to do this has been the cause of the complications that result therefrom.

Complications of this Fracture.—It becomes a complicated fracture when there is a dislocation of the head of the radius. In one case, there was a radial nerve paralysis as a complication. In two cases, in addition to the fracture of the upper third of the ulna, there was a fracture of the neck of the radius. (*See pictures E and F.*) Majority of the cases that were seen were old fractures with undiagnosed dislocation of the head of the radius and the result was malunion of fragments of ulna and persistent dislocation of the head of the radius.

Treatment of this Fracture.—In case of green-stick fractures without dislocation, the treatment is simple. If there is marked bowing forwards, it has to be straightened and the limb is put in flexion at a right angle with the forearm in supination in plaster of

Paris including the wrist and the elbow. (Skin plaster method is used. See picture O.) Local anaesthetic is the anaesthetic of choice in this type of fracture and in some cases, no anaesthetic is necessary. But in the cases where there is marked displacement with associated dislocation (See pictures B, B-1, B-2, and C), the problem becomes difficult. In these cases a general anaesthetic has to be given and the first aim should be to reduce the dislocation which can be done by traction and counter-traction with the limb in extension. Once the dislocation is reduced, the parallelism between the two bones is restored with the result the two fragments of the ulna get into alignment and the limb is then put at right angles maintaining counter-traction on the upper arm and traction on the forearm through the fingers and the thumb, taking care to maintain the forearm in supination. Screening is done or re-X-ray taken after manipulation of fragments. In this position, skin plaster is applied including the wrist and elbow and this is kept on for three weeks in children and for four weeks in adults and at the end of the period, the plaster is slit and the union of the fragments is studied and re-X-ray is taken. If the fragments have united firmly, the patient is given a sling and allowed to do active movements until the recovery of the normal range of movements at the elbow. It is always necessary to make sure that the callus, which is formed at the site of fracture, is firm, otherwise bend occurs at the forearm and though it does not interfere with function, it makes it look ugly. In the cases, where there is marked displacement and malunion with persistent dislocation of the head of the radius, the proper treatment is to remove the head of the radius if the functional result is bad. Where the functional result is not bad except the deformity, it is unnecessary to interfere until the patients demand an operative interference to remove the lump in front of the elbow or there are marked arthritic changes which caused pain during the movements of the elbow. In fractures which cannot be set right by the closed method, open reduction is always necessary and in these cases, it may be necessary to splint the bones by plates until the fragments unite. It is noteworthy that very rarely non-union occurs in this situation. The union is always good and sound even though the fragments unite in bad position. In cases of fracture of the neck of the radius, the displacement being very little, the treatment is the same as in fractures of both bones and as in green-stick fractures of the upper third of the ulna mentioned above. Removal of the head of the radius in old fractures has resulted in restoration of good function as shown in a case 2 years after excision of the head of the radius. (See pictures K, K-1 to K-5, and Case No. 19.) In these cases, however, there is a tendency for exaggeration of cubitus valgus deformity but causes no functional disability.

Conclusion.—Dislocations of the head of the radius are always associated with fractures of the upper third of the ulna with marked displacement of the fragments or marked bowing forwards of the green-stick fracture and they are generally of an anterior type. In green-stick fractures of the upper third of the ulna without marked

bowing forwards of fragments, there was no dislocation. Two cases of congenital dislocations of the head of the radius were found. Those cases that came immediately after the accident even though there was marked displacement of fragments (See pictures B, B-1, B-2, and C), reduction was simple and functional result good. In cases with persistent dislocation of the radius, excision has given very good functional result. In children with persistent dislocation of the head of the radius with malunion of fragments in the upper third of ulna, the functional result in some cases was extremely satisfactory except for a remarkable deformity. (See pictures M, M-1 and N). There was one case of anterior dislocation with radial paralysis with marked displacement of fragments (See pictures A, A-1, and A-2). One of these dislocations of the head of the radius was a posterior and lateral one associated with fracture of middle of shaft of ulna. (KINI)⁴.

My thanks are due to Dr. P. Kesavaswamy for the radiographs, and the Professor of Anatomy for permitting me to do the experiment.

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Appendix

STATEMENT OF CASES

(1) Eu., male, aged 48 years, duration 44 years. Stated that he fell from a chair when he was a boy of 4 years on the left elbow. He was treated for that injury. On examination, flexion was limited at 60°, had hyper-extension forming cubitus recurvatum: increased range of pronation and supination and had marked cubitus valgus deformity with concavity below olecranon on dorsum of forearm. (See pictures H, H-1, H-2 and H-3). He was admitted for stricture of the rectum.

X-ray:—Anterior dislocation of the head of the radius with ill-formed head of the radius and slight bend beyond the upper end of the ulna with convexity anteriorly.

A case of congenital dislocation of the head of the radius. Functional result very good. This case was accidentally found during the course of examination for stricture rectum.

(2) Hindu, male, aged 35 years. Duration: congenital. Congenital amputation of forearm since birth—left elbow.

X-ray showed anterior dislocation of the ill-formed head of the radius with convexity anteriorly of the upper end of the ulna. (See pictures *G* and *G-1*).

Functional result good. Came with his daughter with a congenital recto-vaginal fistula for treatment.

1930. (3) Hindu, male child, aged 6 years.

Fell from a pial on the forearm, duration—one day. Right upper third of the ulna was tender; slight exaggerated concavity on the dorsal aspect of upper third of the forearm. The head of the radius was felt in its normal position.

X-ray showed green-stick fracture of the upper third of the right ulna without dislocation of the head of the radius.

Did not undergo any treatment, probably went to a bone-setter after a diagnosis of fracture.

(4) Hindu, male child, aged 5 years.

Fell while walking on the right forearm. Duration 12 days. Upper third of the ulna was tender, slight exaggerated concavity on the dorsal upper third of the forearm. The head of the radius was felt more anteriorly.

X-ray showed green-stick fracture of the upper third of the ulna with slight displacement of the head of the radius.

Set under an anaesthetic and put in plaster. Result very good at time of discharge. No reply to letter written in 1939.

(5) Hindu, male, aged 25 years, was admitted with a history of a stick being aimed at his head and he warded it off by holding the right forearm in front of his head and the forearm got the impact of blow. Duration 24 days. Fracture upper third of the right ulna with dislocation of the head of the radius was found with marked deformity, involvement of radial nerve with radial paralysis.

X-ray showed fracture of upper third of ulna with signs of union and dislocation of the head of the radius. (See pictures *A*, *A-1*, *A-2*.)

Attempted reduction but failed. Excision of the head of the radius was done and limb put in plaster with the wrist in cock-up position. After 10 days, stitches were removed and physio-therapy started for the radial nerve paralysis which recovered after 4 weeks.

Result at the time of discharge: functional result was very good. No reply to letter written in 1939.

(6) Hindu, female child, aged 5 years. Fell from a chair. Duration 2 hours. Sustained a fracture of upper third of the right ulna with dislocation of the head of the radius.

X-ray showed fracture of upper third of the ulna with dislocation of the head of the radius.

Fracture and dislocation reduced and set in plaster under an

anaesthetic. Functional and clinical result good, at the time of discharge. No reply to a letter written in 1939.

(7) Md. Female child, aged 6 years. Parent stated that the patient had sustained an injury about 3 months before; in the same region, she had an accident resulting in a fracture at the old site of injury of one day's duration.

X-ray showed fracture of upper third of the right ulna showing evidence of old fracture at the site of recent fracture with dislocation of the head of the radius.

It was reduced under an anaesthetic and put in plaster. She did not come for further treatment. Result not known, probably went to a bone-setter.

(8) Hindu, male child, aged 10 years. Fell on the left elbow while at play. Fracture of upper third of the ulna was found. Head of the radius was in normal position.

X-ray showed fracture of upper third of the left ulna without dislocation of the head of the radius.

Put in plaster. Did not report for further treatment. Result not known.

(9) Hindu, female, aged 55 years. Fell due to tripping over a stone on the road side. One day's duration. Fracture of upper third of the right ulna and swelling at the radio-humeral joint. It was difficult to find out whether there was a dislocation or not.

X-ray showed comminuted fracture of the upper third of the right ulna and fracture of the neck of the radius. No dislocation.

Limb put in plaster. Did not come for further treatment. Result not known. Probably went to a bone-setter. (See picture *F*).

(10) Indian Christian, female aged 30 years. History of a fall of one day's duration. Fracture of upper third of left ulna and dislocation of the head of the radius.

X-ray showed fracture of upper third of the left ulna with dislocation of the head of the radius. (See picture *C*.)

After reduction of fracture, limb was put in plaster of Paris in flexion and supination. Did not come for further treatment. Result not known.

1931. (11) Anglo-Indian, female child, aged 6 years. Fell on the left elbow of 5 days' duration. Swelling on upper third of forearm. Supination and pronation painful and limited. Head of the radius was found to be in normal position.

X-ray showed fracture of the upper third of the left ulna without dislocation of the head of the radius. (See pictures *D* and *D-1*.)

Put up in plaster of Paris splint. Result very good. Letter written has been returned from Dead Letter Office.

(12) Hindu, female child, aged 7 years. History of a fall from a compound wall, of one day's duration. Swelling on upper third of the left forearm. Head of the radius was found to be more anteriorly.

X-ray showed fracture of upper third of the ulna and dislocation of the head of the radius.

Put in plaster after reduction under anaesthesia. Result very good. No reply to a letter written on 9-2-39.

(13) Hindu, male child, aged 11 years. History of a fall from a stair-case from a height of 8 feet, of one day's duration. Came sliding down on the right side. Swelling on upper third of the right forearm with deformity. Head of the radius was found to be in normal position but very tender.

X-ray showed fracture of upper third of the ulna with fracture of the neck of the head of the radius. (See picture E.)

Reduction in plaster. Result very good at the time of discharge. No reply to a letter written in 1939.

(14) Anglo-Indian female, aged 13 years. Fell down when attempting to get on a cycle, of one day's duration. Swelling over the upper third of the left forearm, the head was found to be in its normal position.

X-ray showed fracture of upper third of the left ulna without dislocation of the head of the radius.

Reduction and put in plaster. Result very good. Letter written on 9-2-39; reply states that the patient has a perfect elbow with no deformity.

(15) Hindu, female child, aged 5 years. History of a fall from a pial of 2 days' duration. Pain and tenderness at the junction of the upper and middle third of the left forearm. The head of the radius was found in its normal position.

X-ray showed green-stick fracture of the upper third of the left ulna without dislocation of the head of the radius.

Did not come for treatment after the diagnosis was made.

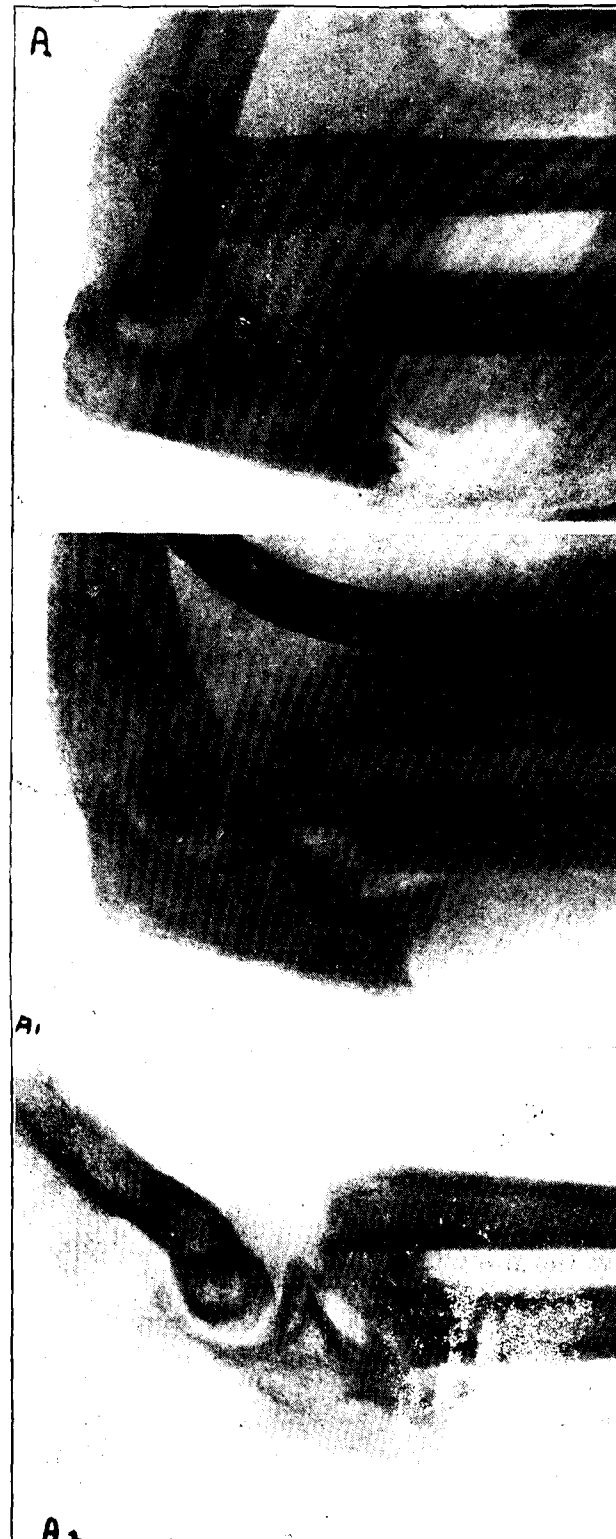
1932. (16) Hindu, female, aged 33 years. History of a fall from a chair, of a few hours' duration. Admitted with an angular deformity in the dorsum of the upper third of the left forearm. Head of the radius could be felt in the normal position. Movements at the elbow limited.

X-ray showed fracture of upper third of the left ulna without dislocation of the head of the radius. (See pictures L, L-1, L-2, L-3, and L-4).

Limb put in plaster without anaesthesia as there was not much displacement. Functional result very good and clinical photo, taken on 9-8-38, shows a good functional result.

(17) Hindu, male, aged 40 years. History of a fall from the roof of his thatched house, of 3 weeks' duration. Was admitted for pain and deformity at the left elbow and middle of left forearm. There was a bulging on the dorsum of the forearm in the middle and a prominence behind the elbow, which was due to the dislocated radial head.

Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna—By M. G. Kini.



Picture A.

A radiogram showing fracture of the upper third of the ulna with dislocation of the head of the radius. Note the displacement between the fragments in the fracture and the displacement of the dislocation.

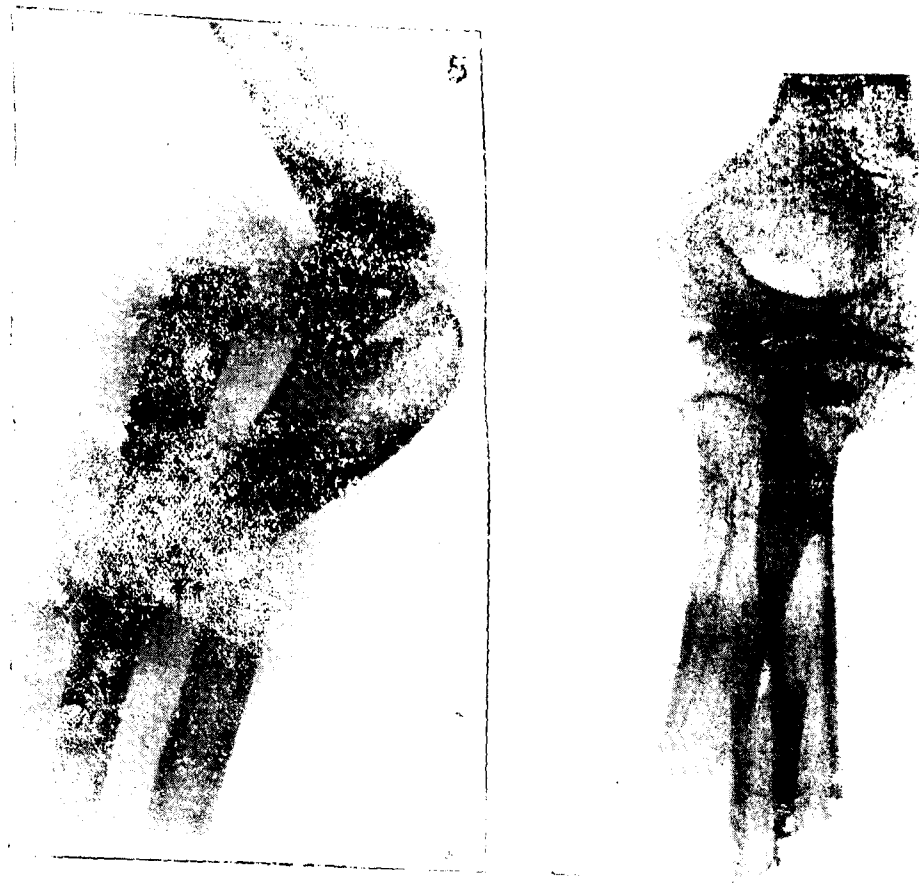
Picture A-1.

A post-operative picture of a radiogram taken after excision of the head of the radius after the fragments have united. Note the malunion.

Picture A-2.

A radiogram taken before the discharge from the Clinic. Note the smoothing of the head of the radius and the firm union between the broken fragments.

Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of the Ulna By M. G. Kinn.

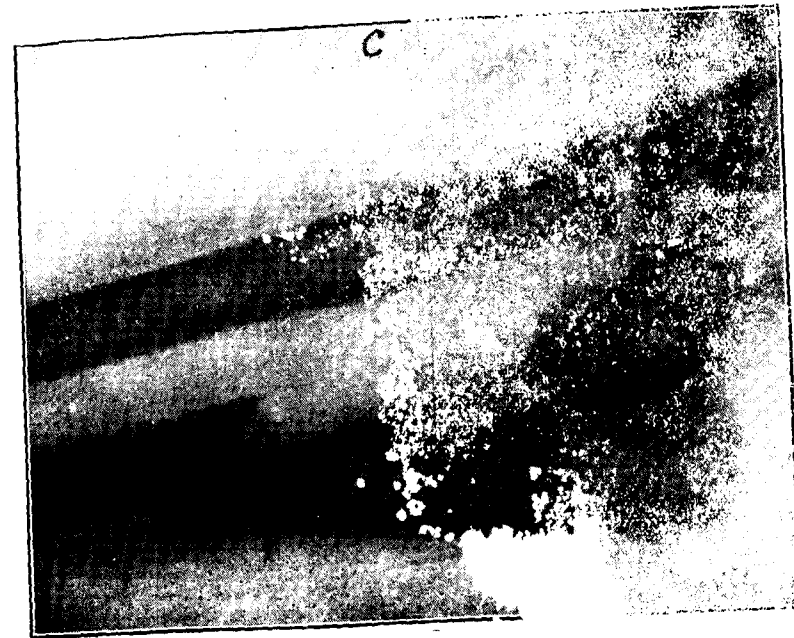


Picture B. is a radiogram of fracture of upper third of the ulna and dislocation of the head of the radius. Note the marked displacement. B-1. is a lateral view of the same showing forward displacement of the radius.



Picture C. shows the result of reduction.

Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna—By M. G. Kinn.

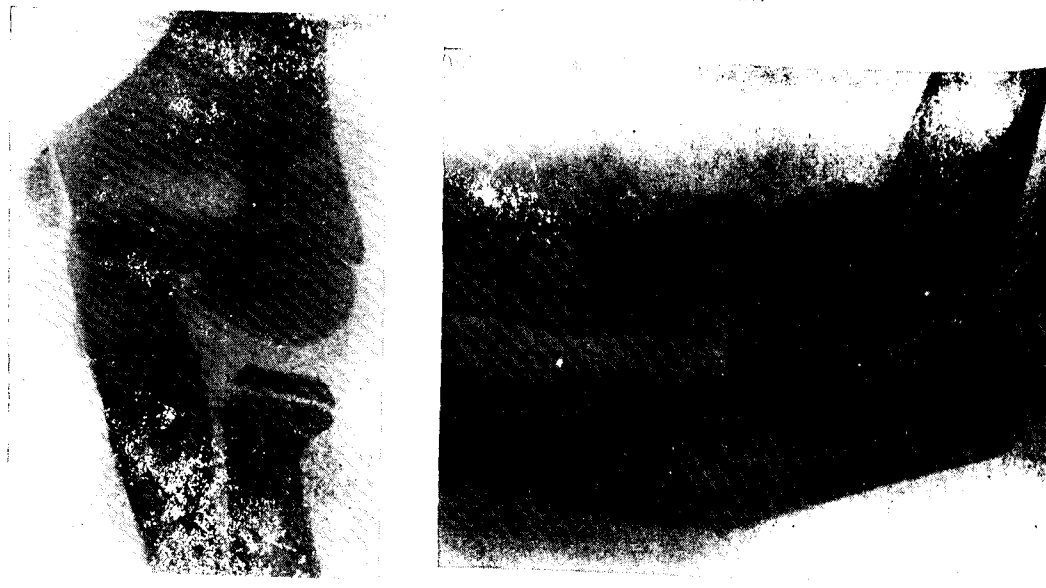


Picture C. shows fracture of upper third of the ulna and dislocation of the head of the radius in an adult.



Picture D. is a radiogram showing a green-stick fracture of the upper third of the ulna with associated dislocation of the head of the radius. D-1. is an antero-posterior view of the same.

Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna—By M. G. Kiri.



Picture A. shows a green-stick fracture of the upper third of the ulna and a green-stick fracture of the neck of the radius.
 B. is a radiographic picture in an adult showing fracture of the upper third of the ulna with fracture of the neck of the radius.



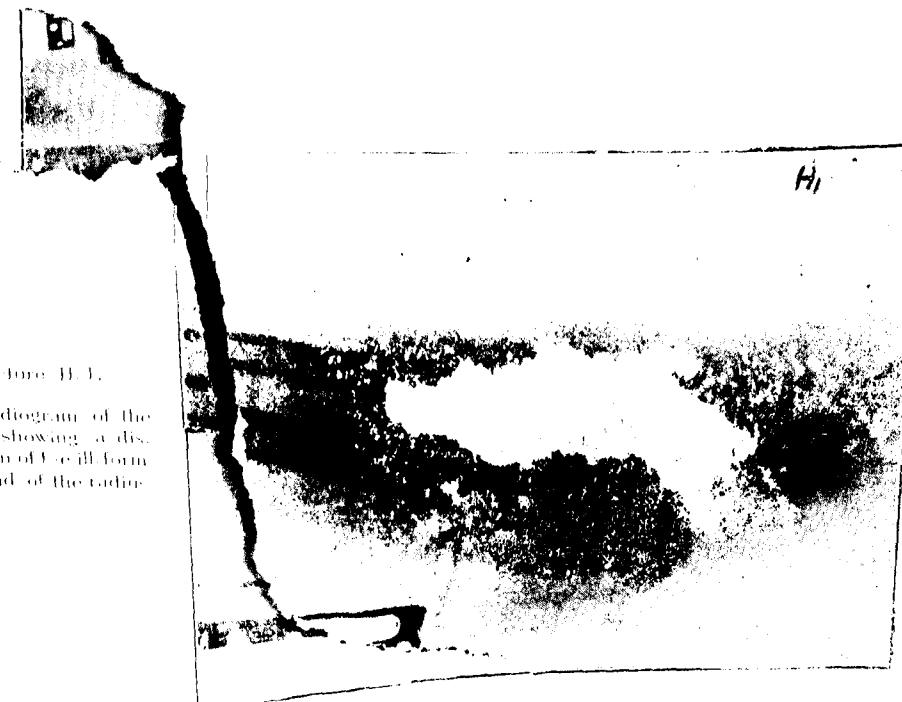
Picture C. is a radiographic picture showing congenital amputation of the forearm. Note dislocation of the ill-formed head of the radius.
 D. is the clinical picture showing the congenital amputation of the forearm.

Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna—By M. G. Kiri.



Picture H.

The clinical picture of a case of congenital dislocation of the head of the radius. Note the flexion of the elbow.

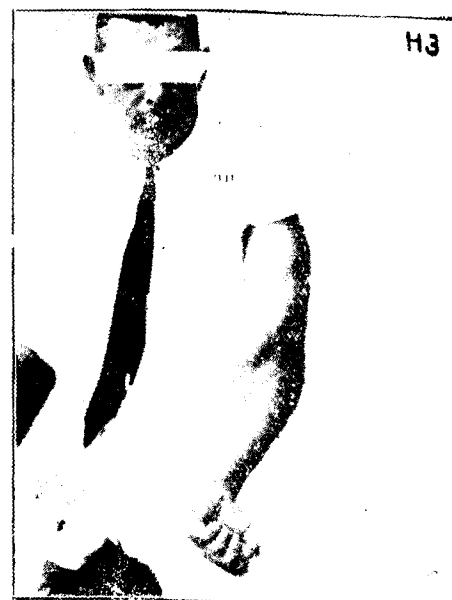


Picture H1.
 Radiogram of the elbow showing a dislocation of the ill-formed head of the radius.

Dislocation of the Head of the Radius Associated with Fracture of the Radius of the Upper Third of Ulna—By M. G. Kini.

Picture H-2.

A clinical picture showing
bilus recurvatum and valgus of
the elbow.



Picture H-3.

This clinical picture shows
the prominence of the elbow.

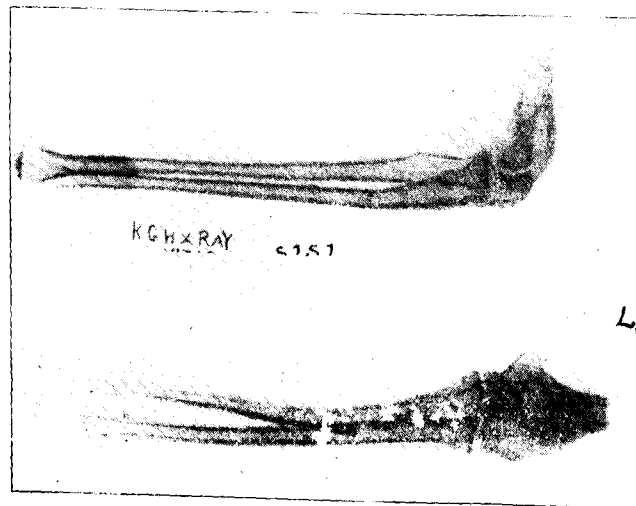
Dislocation of the Head of the Radius Associated with Fracture of the Upper Third of Ulna—By M. G. Kini.



Picture K is a radiographic picture showing marked dislocation of the head of the radius and fracture of upper third of the ulna with displacement of fragments.

- K-1. is an antero-posterior view of the same.
- K-2. shows the result after malunion.
- K-3. shows the result after excision of the head of the radius. Note the firm union of the two fragments.
- K-4. is a clinical picture taken 2 years after the excision of the head of the radius. Note the extension of the elbow.
- K-5. is the clinical picture showing the amount of flexion in the same elbow.

Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna - By M. G. Kinn.



Picture 1.

A radiographic picture showing a fracture of the upper third of the ulna without displacement of fragments. Note the absence of dislocation of the head of the radius.

Picture 1-1.

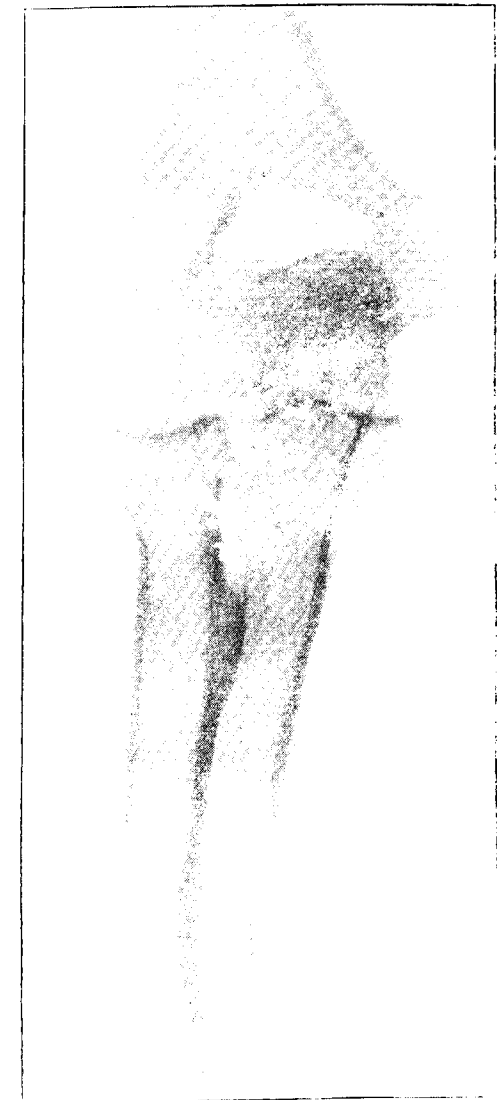
An antero-posterior view of the same.

Picture 1-2.

A radiographic picture taken 18 years after the accident. Note the firm union and very little deformity.



Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna - By M. G. Kinn.



1-3.

Picture 1-3. is a clinical picture showing the complete extension of the elbow.

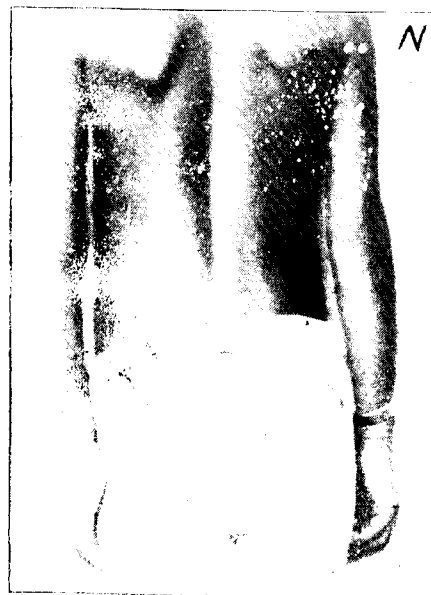
" 1-4. is the clinical picture showing the amount of flexion of the same elbow. Note the absence of any deformity.

Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna—By M. G. Kini.



Picture M. is the clinical picture of the elbow in extension showing a case of malunited fracture of the upper third of the ulna with dislocation of the head of the radius. Note the deformity at the elbow.

Picture M.1 is a clinical picture of the same elbow in flexion. Note the amount of flexion.



Picture N. is a clinical picture of a case of malunited fracture of the upper third of the ulna with dislocation of the head of the radius as viewed from behind. Note the striking deformity.

Picture O. is a clinical photograph illustrating the method of application of Plaster of Paris bandage.



Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna—By M. G. Kini.

Picture A.

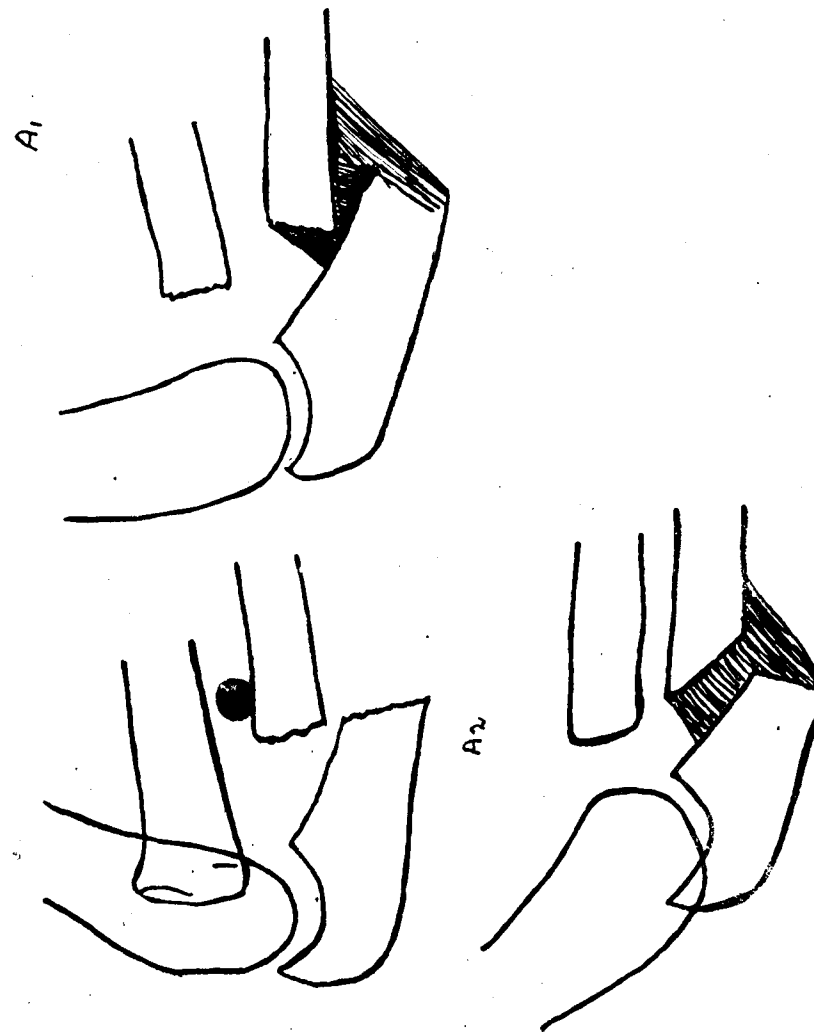
is a tracing from a radiogram showing fracture of the upper third of the ulna with dislocation of the head of the radius. Note the displacement between the fragments in the fracture and the displacement of the dislocation.

Picture A.1.

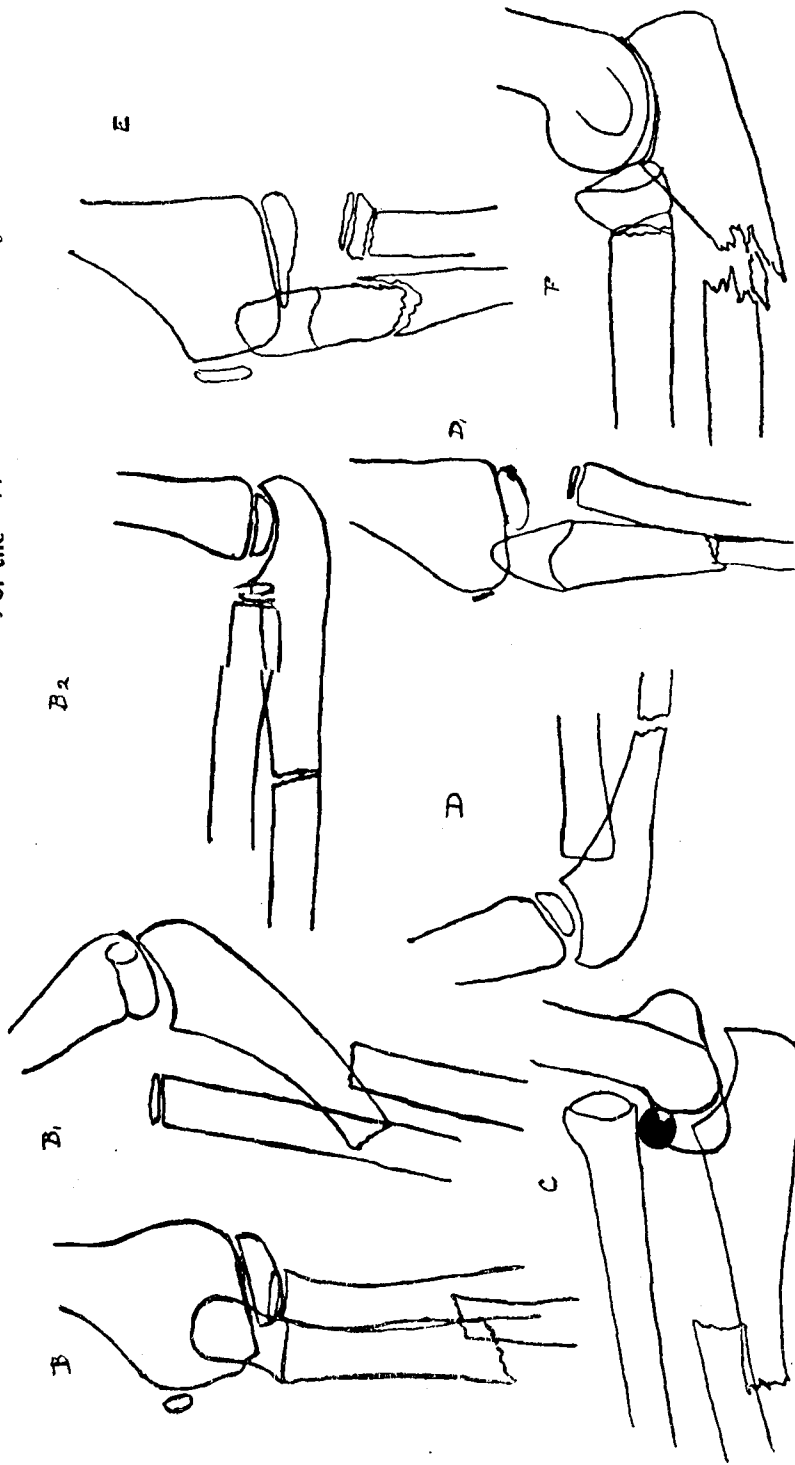
is a post-operative picture of a radiogram taken after excision of the head of the radius after the fragments have united. Note the malunion.

Picture A-2.

is a tracing of a radiogram taken before the discharge from the Clinic. Note the smoothing of the head of the radius and the firm union between the broken fragments.



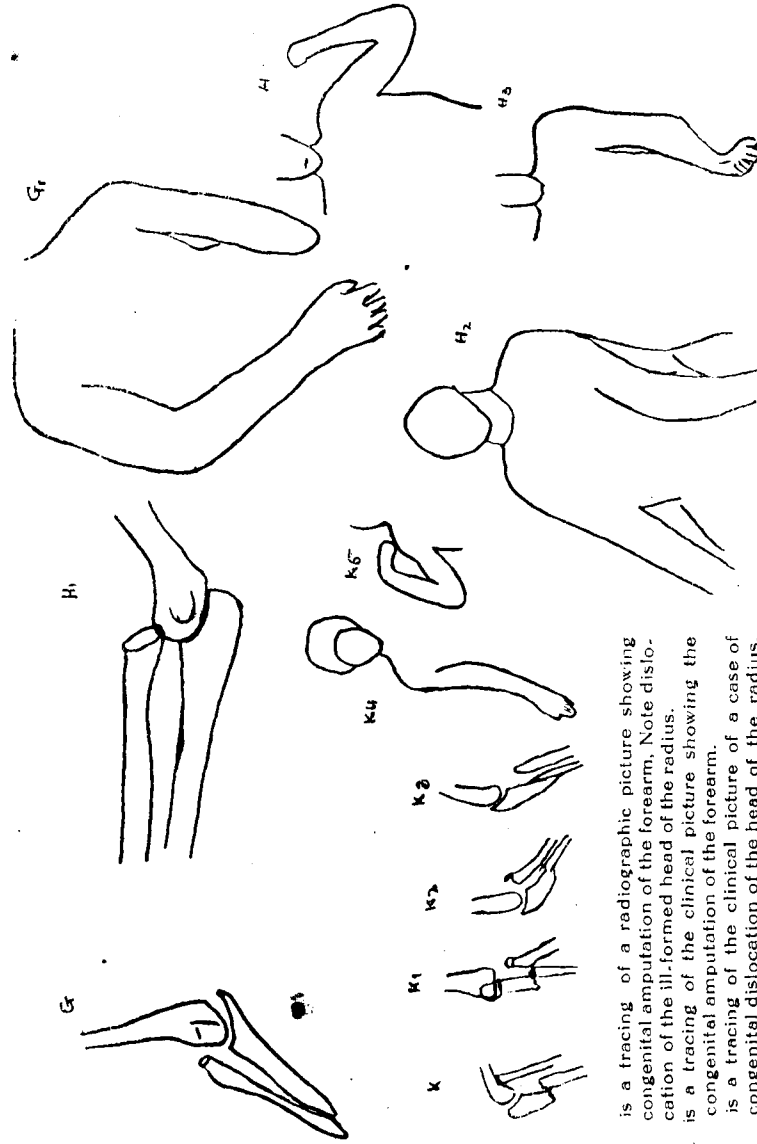
Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna—By M. G. Kini.



- Picture B. is a tracing from a radiogram of fracture of upper third of the ulna with dislocation of the head of the radius. Note the marked displacement.
- B-1. is a lateral view of the same showing forward displacement of the head of the radius.
- B-2. shows the result of reduction.
- C. shows fracture of upper third of the ulna and dislocation of the head of the radius in an adult.

- Picture D. is a tracing from a radiogram showing a green stick fracture of the upper third of the ulna with no dislocation of the head of the radius.
- D-1. is an antero-posterior view of the same.
- E. shows a green-stick fracture of the upper third of the ulna and a green-stick fracture of the neck of the radius.
- F. is a tracing of a radiographic picture in an adult showing fracture of the upper third of the ulna with fracture of the neck of the radius.

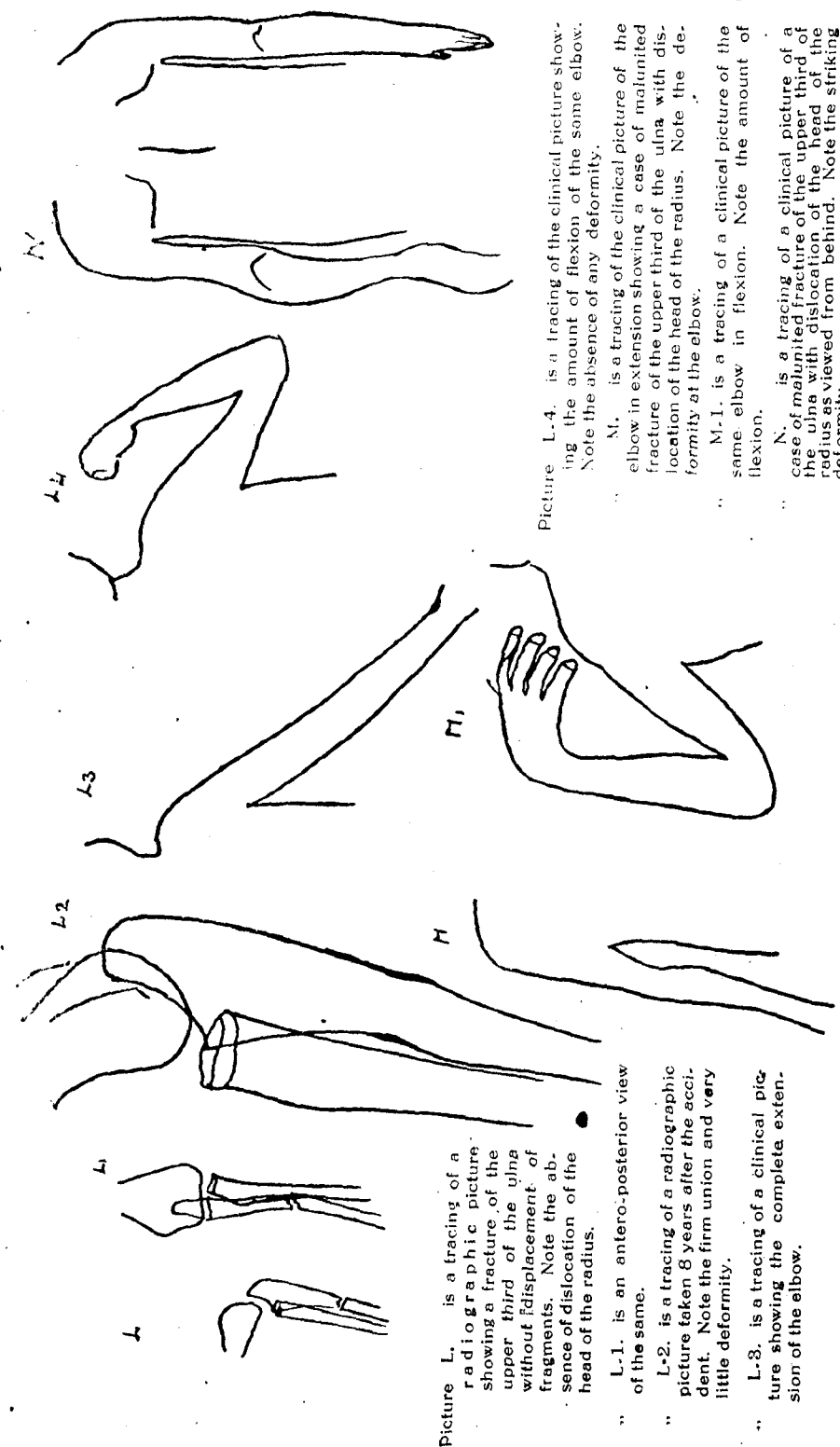
Dislocation of the Head of the Radius Associated with Fracture of the Radius of the Upper Third of Ulna—By M. G. Kini.



- Picture G. is a tracing of a radiographic picture showing congenital amputation of the forearm. Note dislocation of the ill-formed head of the radius.
- G-1. is a tracing of the clinical picture showing the congenital amputation of the forearm.
- H. is a tracing of the clinical picture of a case of congenital dislocation of the head of the radius. Note the flexion of the elbow.
- H-1. is a tracing of the radiogram of the elbow showing a dislocation of the ill-formed head of the radius.
- H-2. is a tracing of a clinical picture showing cubitus recurvatum and valgus of the elbow.
- H-3. is a tracing of the clinical picture showing the pronation of the elbow.
- K. is a tracing of a radiographic picture showing marked dislocation of the head of the radius and fracture of upper third of the ulna with displacement of fragments.

- Picture K-1. is an antero-posterior view of the same.
- K-2. shows the result after malunion.
- K-3. shows the result after excision of the head of the radius. Note the firm union of the two fragments.
- K-4. is a tracing of clinical picture taken 2 years after the excision of the head of the radius. Note the extension of the elbow.
- K-5. is a tracing of the clinical picture showing the amount of flexion in the same elbow.

Dislocation of the Head of the Radius Associated With Fracture of the Upper Third of Ulna—By M. G. Kini.



Picture L. is a tracing of a radiographic picture showing a fracture of the upper third of the ulna without displacement of fragments. Note the absence of dislocation of the head of the radius.

" L-1. is an antero-posterior view of the same.

" L-2. is a tracing of a radiographic picture taken 8 years after the accident. Note the firm union and very little deformity.

" L-3. is a tracing of a clinical picture showing the complete extension of the elbow.

Picture L-4. is a tracing of the clinical picture showing the amount of flexion of the elbow. Note the absence of any deformity.

M. is a tracing of the clinical picture of the elbow in extension showing a case of malunion of the upper third of the ulna with dislocation of the head of the radius. Note the deformity at the elbow.

M-1. is a tracing of a clinical picture of the same elbow in flexion. Note the amount of flexion.

N. is a tracing of a clinical picture of a case of malunion of the upper third of the ulna with dislocation of the head of the radius as viewed from behind. Note the striking deformity.

DEC. '40] DISLOCATION OF THE HEAD OF THE RADIUS—M.G. KINI 1067

X-ray showed fracture of the middle shaft of the ulna with posterior and lateral dislocation of the head of the radius.

Closed reduction tried but failed and so open reduction was tried but it was found difficult to retain it in position and so excision of the head of the radius was done with open reduction of the two fragments of the ulna and limb put in plaster. Result very good. (KINI)⁴.

(18) Hindu, male child, aged 10 years. History of a fall from parallel bars, of one month's duration. Showed angulation of left forearm in the upper third with dislocation of the head of the radius upwards and forwards. Flexion of elbow limited by 15°, extension limited by 20°. (See picture N.)

X-ray showed old, healed fracture of the upper third of the right ulna and unreduced dislocation of the head of the radius.

Reduction was attempted but failed. No operative interference was advised as the movements of the elbow were fairly good. No reply to a letter written in 1940.

(19) Hindu, female, aged 25 years. Result of a railway accident, of a few hours duration. Admitted with a compound fracture of the upper third of the right ulna with abrasions all over the elbow. Transverse cut wound extending over the frontal bone and another wound behind the right ear. She was unconscious but the pupils were equal and reacting and bladder was distended.

X-ray showed fracture of the upper third of the ulna with dislocation of the head of the radius.

It was first treated on Winnet-Orr lines. Later, extension in Thomas's arm splint was tried to get the fragments into alignment but proved a failure. So excision of the head of the radius was done after the compound lesion had healed. Functional result was good. She reported after 2 years. (See pictures K, K-1, K-2, K-3, K-4, and K-5.)

1937. (20) Hindu, female child, aged 7 years. History of a fall, of 2 months' duration. Admitted with a marked deformity of the upper third of the right forearm with movement of the elbow slightly limited in flexion. Extension complete. (See pictures M, and M-1).

X-ray showed old, healed fracture of the upper third of the ulna with unreduced dislocation of the head of the radius. Advised no surgical interference.

1938. (21) Hindu, male child, aged 12 years. Was admitted with a history of a fall of one day's duration with marked swelling of the upper third of the left forearm and the elbow.

X-ray showed fracture of upper third of the left ulna and dislocation of the head of the radius. (See pictures B, B-1, and B-2).

Under Chloroform, reduction was done and limb put in plaster of Paris. Result very good.

Eventration of the Diaphragm With Reports of Two Cases*

BY

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Introduction.—In recent years, a few interesting papers on this rare congenital anomaly have appeared in the Indian Medical Literature. Even as KUTUMBIAH and KESAVASWAMY (1937) have pointed out, every case of eventration deserves very careful study and report, even though at first sight, this condition might seem to be one of trivial importance. The subjects of this deformity are few, their sufferings are slight and there is nothing that we can do to restore a normal balance to them. But the curiosities of medical practice have their value if they stimulate in us the inquiring attitude of mind, so that, the study of even the rarest of abnormalities of development might ultimately assist us to a knowledge of how to prevent the congenital deformities, which, in their graver manifestations, are the cause of serious disability, or even acute suffering. The general practitioners are not in a position to diagnose these cases easily, due to lack of definite clinical signs and facilities for expert radiological examination are not available everywhere. Moreover, the foreign literature concerning eventration of the diaphragm is scattered and at times confusing and contradictory. Hence, we feel justified in presenting a brief resume of the literature on this subject.

Name.—‘Eventration of the diaphragm’ means clinically a congenital, or occasionally an acquired, high, or elevated position of one leaf of the diaphragm—characterised pathologically by aplasia, or atrophy of the muscle fibres of the affected side, but no break in the continuity of the muscle—which, in the vast majority of cases, produces symptoms suggesting gastric, cardiac, pulmonary, or pleuro-pulmonary origin. Many writers have objected to the name ‘eventration’. Thus, KONIGER called it “Idiopathic high lying diaphragm”; MORRISON called it “PETIT’s disease”; LORD, “Elevation of diaphragm”, and others, “High diaphragm”, “Relaxed diaphragm” and “Insufficiency of the diaphragm” etc., thus showing that the term ‘eventration’ is incorrectly used and is, therefore, a misnomer.

History.—The name ‘eventration’ was given first by BECLARD, as mentioned in the writings of CRUVEILHIER (1849). WOOD and WOOD (1931) mentioned that JEAN LOUIS PETIT (1674-1750) gave the name

* Specially contributed to “The Antiseptic”.

“Eventratio diaphragmatica”. REED and BORDEN (1935) contend that, though the first authentic case was reported by PETIT after post-mortem examination, he did not give the name, ‘eventration’. Subsequently, HOWARD MARSH (1867) published the first instance of a clinical examination and a correlation of clinical signs with autopsy findings. Later, THOMA (1882), TENNANT (1894) and KRONIG (1898) have recorded further cases. WOODBURN MORRISON wrote the first monograph on the subject. EPPINGER was the first to describe a case of right-sided eventration, and later, HAMIDE, BAYNE-JONES etc., have added further such cases. All the above cases were discovered at autopsy and descriptions referred to appearances at post-mortem. WIDENMANN first described the radiological appearances in 1901 and BAETGE (1913) recorded the electro-cardiogram in eventration, for the first time.

Incidence.—In 1921, KORN reported a critical review of 65 cases. REED and BORDEN collected up to the end of 1935, only 183 cases in the literature. And since that year, a score of cases have been published from time to time. LORD (1927) stated that he discovered four instances of eventration out of 16,504 radiological examinations. NEWCOMET and SPACKMAN (1936) reported four cases out of 17,295 radiological examinations of the chest. KUTUMBIAH and KESAVASWAMY discovered in Vizagapatam only one case in 5600 gastro-intestinal and thoracic roentgenograms. One of us, ARUNACHALAM, (1937) could get only one case of eventration out of 3000 and more skiagrams of the chest in the Tuberculosis Clinic at Spur Tank, Madras. CHAUDHURI recorded two cases in about 6000 radiological examinations in Calcutta. ACHAR discovered two instances, one at Tanjore and one at Madura. SUNDARAM *et al*, in 1937 reported one case from the General Hospital Madras, in a man of fifty years. Thus, only seven cases of eventration of the diaphragm including ours, have been described in the Indian Medical Literature and this paucity is probably due either to the rarity of the condition or lack of vigilance on the part of the clinicians to suspect the condition. NEWCOMET and SPACKMAN have also stated that the condition was as common as hernia of the diaphragm and gave the proportion of hernia to eventration as 1:1. EPPINGER (1927) considered hernia more common and gave the ratio as 37:1.

Most of the described cases are of the left side and a few are of eventration of the right side. These might have been instances of acquired diaphragmatic paralysis, as most workers hold that true eventration occurs only on the left side. NICHOLAS and NUSSBRECHER (1935), HAMIDI, BAYNE-JONES, GOLOB, WESSLER and JACK have contributed to the medical literature cases of right-sided eventration. REED and BORDEN (1935) found that out of 183 cases, the left leaf of the diaphragm was affected in 165 cases. They also found in their analysis, that more males than females were affected (4:3). They further stated that out of a group of 83 cases, 30 were in patients below 25 years and 25 cases were in children below 12 years. Our cases also are in juveniles below 12 years of age.

Ætiology.—REED and BORDEN, after a critical review of case reports, observations and theories, conclude that there was no specific cause for eventration. They state that it is apparently congenital, though many instances have been cited of cases of acquired condition and those associated with other pathological states, if not actually produced by them. The early cases point to a congenital origin and though there is much confusion regarding the ætiology, they state that one must accept both views.

Before considering the theories of origin of the condition, a brief account of the development of the diaphragm is given. The pericardial, pleural and peritoneal cavities of the adult are formed by the subdivisions of the embryonic cavity. The anterior end of the coelom containing the heart is shut off by a partition which forms at about the sixth week of intra-uterine life, and at a slightly later date, the pleural sacs are separated from the peritoneal cavity by the completion of the diaphragm. The greater part of the latter is formed from the septum transversum which is ventral in situation, while the dorsilateral portions are derived from the pleuro-peritoneal membranes which close the communication ducts between the two cavities of the right and left sides. The musculature of the diaphragm is developed from two muscle masses from the fourth cervical myotome. These grow into the developing diaphragm, while the septum transversum is still in the cervical region. Later, the diaphragm migrates caudally to reach its proper place. In congenital elevation, the right side of the diaphragm is in its normal position, while the left cupola forms a thin sac with normal attachments, but projecting into the thorax to reach a high level. WOOD and WOOD suggest that neither a failure of migration, nor a failure of union of the component parts of the diaphragm, as in hernia, is responsible, but a failure of development of the musculature of one side, which ultimately results in replacement by thin membrane, yielding readily to the abdominal pressure. Such a sequence might be expected, for, the pressure in the pleural cavities is lower than that in the abdominal cavity and a membranous diaphragm would fail to fulfil its pressor function. But KUTUMBIAH and KESAVASWAMY suggest that the super-elevation of the diaphragm may be produced by a lack of development of the usually actively growing lung buds, or a congenital maldevelopment of the diaphragm. Though the primary cause—aplasia of the lung with resultant raising of the diaphragm to fill the vacancy, or congenital malformation of the diaphragm with resultant pulmonary aplasia—is controversial, they are of opinion that both the factors operate.

I. Theory of Congenital Origin.—The following points do warrant and substantiate this theory. 1. Relative frequency of eventration on the left side. 2. Frequency in the foetuses, in the new born and young children. 3. Associated congenital anomalies. 4. Absence of symptoms for a long time.

1. *Relative frequency on the left side:*—REED and BORDEN state that out of their 183 cases, in 165 the left leaf of the diaphragm was affected. REYGENSTEIN and others suggested that the relative

infrequency on the right side was due to the fact that the liver protected the right side and that the left leaf was the last to close. CUTTLER and COOPER gave a different explanation. According to them, since the liver was formed under the septum transversum, it, during a large part of intrauterine life, protected the left side as much as the right. They believed that the preponderance on the left side was due to the distribution of the vascular elements which play such an important role in the early formation of the embryo. It seems possible that the vascular concentration in the region of the right half of the diaphragm would contribute to the strengthening of that organ and blocking of the pleuro-peritoneal canal, while the atrophy of the common cardinal veins of the left side would contribute to the weakening of the left half of the diaphragm.

2. *Frequency in foetuses, newborn and young children:*—REED and BORDEN record the presence of 30 cases in patients below 25 years of age in one group of 83 cases, with majority in the newborn. This fact also seems to support the congenital view of origin.

3. *Other associated congenital anomalies:*—Transposition of one or more of the intra-abdominal viscera has been reported by MORRISON, LORD, etc. Megacolon was present in a case reported by ARONSON. Other abnormalities in association with eventration recorded in the literature are, aplasia of the lung, hypospadias, undescended testes, abnormally lobulated lung, rotation of the œsophagus, aortic hypoplasia, reduction in the size of the phrenic nerve, œsophageal diverticula and non-rotation of the stomach. Uniform absence of evidence of compression of the lung was the strongest support for this theory.

4. *Absence of symptoms for a long time:*—If eventration be of acquired origin, the symptoms should begin to manifest at the time of onset in all cases but in most cases, very little or no symptoms are complained of for a long time.

II. Theory of Acquired Origin.—A glance through the available literature on eventration reveals a vastly varying group of causative factors like trauma, toxæmia from acute infections, pulmonary tuberculosis, subphrenic abscess, mediastinal tumour, chronic gastric disturbances like ulcer and carcinoma, lesions of phrenic nerve other than trauma, pregnancy, thoracic growth, subdiaphragmatic hydatid cyst and aneurism of the aorta. LERICHE mentioned typhoid, diphtheria, septicæmia, nephritis, erysipelas, pericarditis, endocarditis, rheumatic fever, Huntington chorea, alcoholic neurites, spinal hæmorrhage and tumours of the spinal canal as causes. Many writers like MORRISON etc., having found pulmonary tuberculosis in many cases of eventration, pointed it out as the ætiological agent but KUTUMBIAH and KESAVASWAMY have not come across a radiogram resembling that of true eventration in a series of 2500 skiagrams of chest in persons with tuberculosis.

Pathology.—1. *Changes in the diaphragm:*—In all cases, the diaphragm was markedly elevated. BAYNE-JONES, from a study of 22

gastric bubble on the medial side, forming a triangle between and below these two organs, is a splendid presumptive finding in favour of eventration.

4. *Movement of the diaphragm on the affected side*:—MORRISON and others believed that reversed or paradoxical movement of the diaphragm, designated as "Keinbock's Phenomenon", suggested eventration, while, LORD, NICHOLAS and NUSSBRECHER and others noted limited but normal movement. REED and BORDEN state that the movement of the involved diaphragmatic leaf may be normal, diminished, absent or reversed, either in eventration or in hernia and, hence as a sign is not of reliability.

The cardiac shadow is greater on the right side in both hernia and eventration and this is often mis-diagnosed as dextrocardia. This is only due to the heart being pushed to the anterior thoracic wall, resulting in the total upward displacement of the organ, rotation and elevation of the apex and curving of the aorta with broadening of the aortic shadow.

Electro-Cardiography.—This is usually resorted to, due to the apparent dextrocardia. BÄRTGE, who first recorded the electro-cardiogram in eventration, found some variations from the normal which were not confirmed by other workers.

Diagnosis.—A positive diagnosis is difficult to make from physical and clinical examinations alone. One can suspect hernia, eventration or, pneumothorax but radiology is absolutely necessary. The differential diagnosis between hernia and eventration is not always easy and is very important as prognosis is good in eventration and doubtful in hernia and is given in the table below.

HERNIA.	EVENTRATION.
1. Symptoms of acute pain, usually after trauma. Often chronic dyspepsia and dysphagia.	No symptoms or mild symptoms of chronic nature.
2. Pain, vomiting and flatulence after meals.	Slight heart-burn, or acid eructations.
3. Percussion and auscultation findings differ considerably before and after meals.	Percussion and auscultation findings always the same.
4. Marked displacement of the heart to the healthy side. Congestion of the lung on the diseased side.	Marked cardiac displacement and congestion of the lungs often absent.
5. Definite hole in the diaphragm.	No hole in the diaphragm.
6. Prolapsed abdominal organs vary in position.	Stomach always in the same position and bilocular.
7. Only one known case of double convex parallel lines visible.	Parallel convex lines frequently seen.
8. May be right or left sided.	Mostly left sided.
9. If traumatic, may be associated with pleural effusion or pneumothorax.	Seldom associated with effusion or pneumothorax.
10. Hernia dangerous on account of possible strangulation.	Prognosis excellent.
11. May be acquired or congenital.	Always congenital.

(Recent Advances in Radiology 1936)



Fig. 2.—Case 1, Chinnaiah. Antero-posterior view of the chest without barium meal, showing the left dome of the diaphragm at the 4th rib and the heart pushed to the right side (standing).

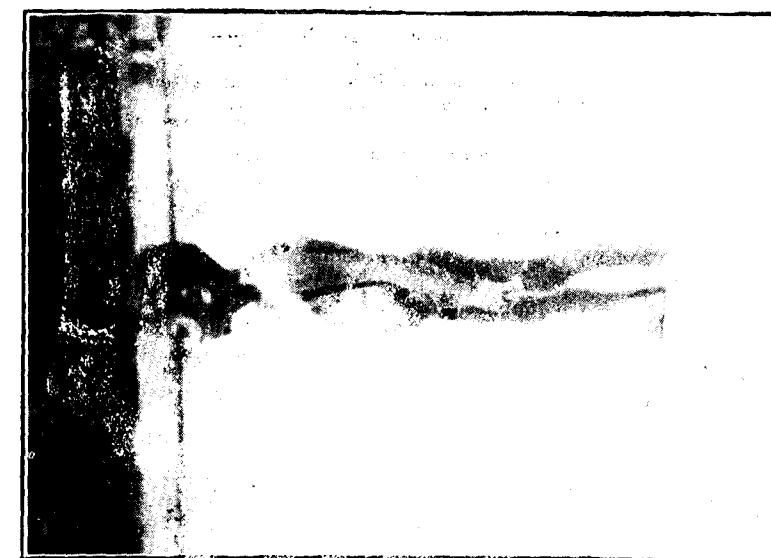


Fig. 1.—Case 1, Chinnaiah, 12 years.



Fig. 3.—Case 1, Chinnaiah.
Anterior view of chest without barium meal showing the left dome of the diaphragm and heart clearly pushed to the right side (lying).



Fig. 4.—Case 1, Chinnaiah.
Left lateral view of the chest with barium meal showing the full stomach under the diaphragm, thus excluding hernia of the latter. (lying).

Eventration of the Diaphragm with Reports of Two Cases—By P. Arunachalam and U. Srinivasa Rao.



Fig. 5.—Case 1, Chinnaiah.
Anterior view of the chest with barium meal showing the stomach under the left dome of the diaphragm, thus excluding hernia of the latter. (standing).

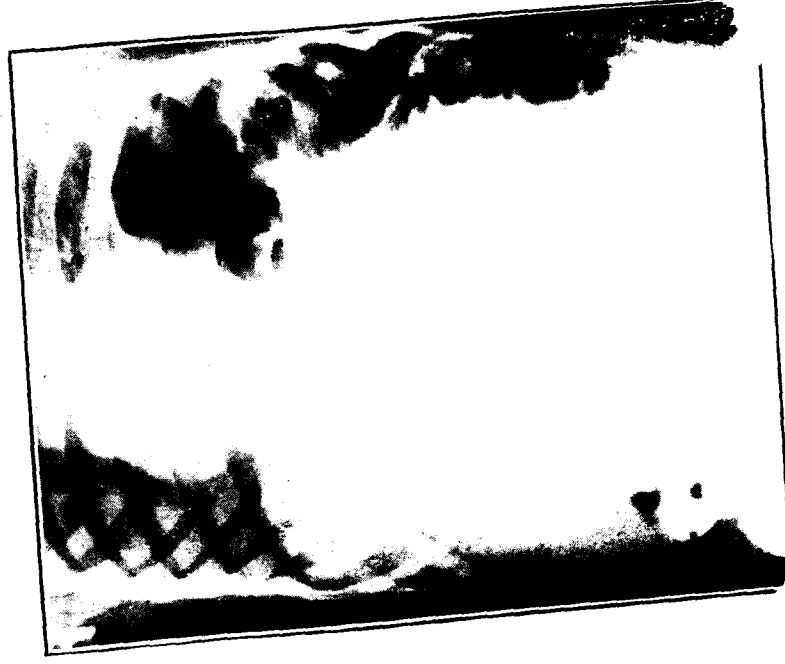


Fig. 6.—Case 1, Chinnaiah.
Left lateral view of the chest with barium meal showing the stomach under the left dome of the diaphragm, thus excluding hernia of the latter. (standing).



Fig. 3.—Case 2. Navaneetham, 10 years. Anteroposterior view of chest without barium meal showing the heart pushed to the right. Small even indentation of left side and cystic condition of the right upper pulmonary zone (standing).

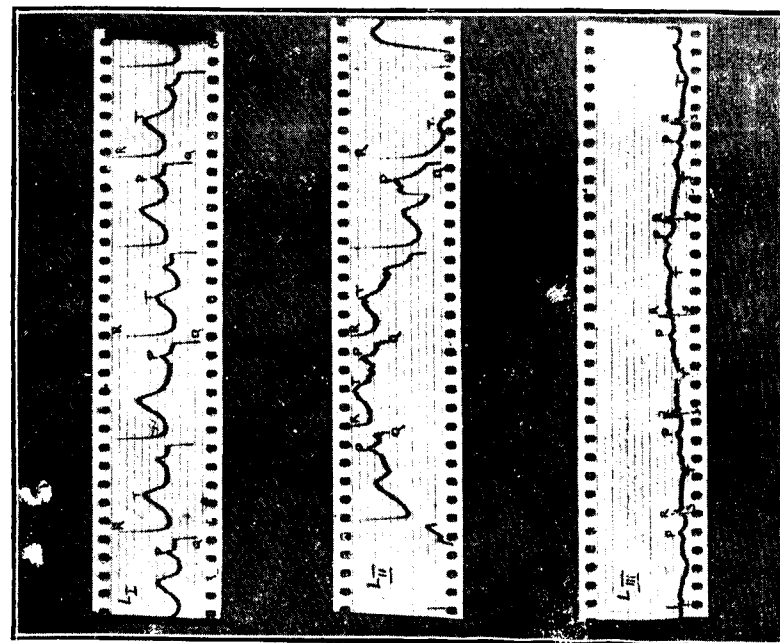


Fig. 7.—Case 1. Chinnaiah. Electrocardiogram, excludes dextrocardia from a study of Lead I.

The other diseases considered in the differential diagnosis are, paralysis of the diaphragm, congenital absence of the left leaf of the diaphragm, pleurisy with effusion, thickened pleura, thoracic stomach, pulmonary cysts, pulmonary tumours, atelectasis, emphysema, and neurosis.

Prognosis.—As far as life is concerned, it is good; but in many cases, it is a disabling disease. If there are no severe symptoms within the first five years of life, the prognosis is very good.

Treatment.—Medical management is the treatment of choice and it is meagre and entirely symptomatic. Curative treatment is impossible. Surgical treatment like plication is sometimes done, but is not a marked success.

CASE REPORTS

CASE 1. Chinnaiah, a dumb male boy, aged 12 years, (*Fig. 1.*) was brought to the Tuberculosis Clinic of the Government Royapuram Hospital, for a cough of a month's duration.

His past and present history were not of any importance. On examination, his growth and general condition were good except for his dumbness from birth. All his systems were normal except for diminished air entry at the base of the left lung. Routine radiographic examination of his chest revealed the eventration of his left dome of the diaphragm. Later, a complete radiographic examination of his chest and alimentary tract and electro-cardiogram were done. The radiograms and the electro-cardiogram are herewith appended.

Fluoroscopic Examination of Chest.—The right dome of the diaphragm exhibited normal excursions and the left, a little diminished movement. There was no exaggeration on the right to compensate for the left and during deep breathing there was no paradoxical movement. The left dome was at the level of the 4th rib anteriorly. Heart was pushed to the right and its transmitted pulsation to the right dome of the diaphragm, was distinctly visible.

Radiograms.—When the radiogram is taken in the erect posture, a characteristic picture is obtained. The dome on the left side is seen at the level of the third rib anteriorly. A large gastric air bubble is seen, above which arches the bow-line of the diaphragm. The right dome is in its normal situation. The heart's shadow is displaced to the right and the bifurcation of the trachea is similarly displaced. The lung fields are clear (*Fig. 2*).

When taken in the recumbent posture, the picture is the same except that no stomach air bubble is made out. (*Fig. 3*).

The left lateral view, with barium in the stomach, in the recumbent posture with the foot of the X-ray couch raised, shows the stomach well outlined below the left dome and no barium is seen lying above the diaphragmatic level (*Fig. 4*). This appearance distinguishes this condition from a diaphragmatic hernia. In that condition, the opaque meal is seen in the pouch above the diaphragm.

The right oblique view shows the double line of LIGHTWOOD, characteristic of eventration (*Fig. 5*). In the erect posture, the splenic flexure of the colon is seen well outlined under the left dome (*Fig. 6*).

Electro-Cardiogram.—It shows sinus rhythm. Q wave is seen in Leads I and II. There is left axis deviation. T is inverted in Lead III. A study of Lead I excludes dextro-cardia. (*Fig. 7*).

CASE 2. Navaneetham, a 10 year old female child, was referred to the Tuberculosis Clinic, at Spur Tank, in 1937, for evidence of pulmonary tuberculosis. A routine skiagram of chest revealed a small eventration of the left dome of the diaphragm and a cystic condition of the upper lobe of the right lung (*Fig. 8*). She could not be further traced.

Summary.—1. Both cases described above are in juveniles.

2. Case 1, showed the double line of LIGHTWOOD, a high elevated left dome of the diaphragm and cardiac displacement to the right side.

3. There was no bilocular stomach, no paradoxical movement of diaphragm on screening and no dextrocardia in Case 1.

4. Case 2, showed in addition, cystic disease of the lung, a commonly associated congenital anomaly.

Acknowledgments:—Our thanks are due to Dr. J. Suryaprakasa Rao, M.B.B.S., Radiologist, Government Royapuram Hospital, for his excellent Radiographs and to Dr. K. Manjunath Rai, D.M.R., F.R.C.S.E., of The Barnard Institute of Radiology, for his screening interpretations and for the reduced prints of the Radiographs. We are indebted to Dr. A. V. S. Sarma, M.B.B.S., D.CH. (LOND.), Hony. Asst. Physician, Government Royapuram Hospital, for the clinical photo of Chinnaiah—Case No 1. We are also grateful to the Superintendent, Government Royapuram Hospital, and the Surgeon-General with the Government of Madras, for their kind permission to reproduce these cases.

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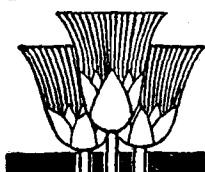
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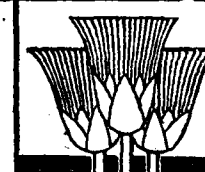
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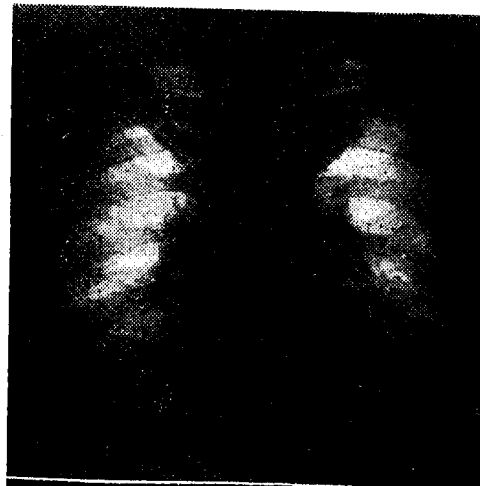
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Captain A. T. Andreasen, F.R.C.S., I.M.S.,
Principal, Orissa Medical School, Cuttack.

IN the winter of 1934, I came accidentally across the fact that the intravenous injection of Alcohol was of great value in pneumonia. The case was one of a Bandsman of the Bengal Sappers and Miners, a hill man, and, particularly prone to chest diseases as those races are, this man developed a severe attack of pneumonia involving both lungs. Hyperpyrexia, delirium, and signs of heart failure were all evident by the sixth day after the onset. Every possible form of therapy then available had been applied (M. and B. 693 had not yet introduced while Sulphanilamide had only just been heard of); the best nursing available was his. Intravenous feeding was the only means of keeping up his strength. A continuous intravenous drip of Normal Saline with 5% Glucose was used from the third day at 20 drops per minute. Into this was introduced doses of whatever drugs were required, including Digitalin, Antistreptococcal Serum, etc.

The sputum he spat showed an enormous number of short chains of Streptococci, hence the Serum given.

Blood counts done within the first 24 hours showed a W.B.C. of 13,600 p.c.m. and H.b. of 75%; 48 hours later, the W.B.C. was only 9,000 p.c.m. and the H.b. 50%. By the sixth day, the W.B.C. was only 4,500 p.c.m. and the H.b. 40%.

Both lungs were clinically solid by this time and there were signs of a right heart failure.

Venesection was performed. Simultaneously, half the the total quantity of blood drawn off was replaced by a suitable donor, citrated blood given slowly into the container of the intravenous saline apparatus and a steady stream of oxygen bubbled through the mixture. The patient appeared improving about two hours later and maintained this improvement throughout the 6th night.

On the seventh morning, however, his condition was quite obviously deteriorating once more.

I thought that brandy might help him, but he could not be made to swallow it. I injected 30 c.c. of brandy into the rubber tubing of of the saline drip apparatus. The effect was remarkable. He visibly improved in a period of minutes. Within 15 minutes, he was quiet and his cough had ceased. At the end of 35 minutes, he was sleeping soundly and his pulse had improved very much. Respirations were still over 50 p. m. and cyanosis still present. He remained quiet for four hours, and then slowly became conscious for the first time for

* Specially contributed to 'The Antiseptic'.

four days. The pulse has improved very much in quality although still over 100 p. m.; temperature remained at 104.8°F. There was no sweating. The lung signs remained constant. He talked rationally now, and began to drink from a feeding cup. Cough was much less irritable than before.

He began to get restless as night drew on, however, and showed signs of wandering in his mind again. I repeated the dose of brandy intravenously as before. The effects were the same. He slept through the seventh night fairly well and quietly. His cough hardly worried him at all. It was further noticed that there was no sputum. On the 8th morning, the temperature was 104°F., pulse 115, respiration 48, cough nil, sputum nil; he was conscious and cooperating and stated that he felt much better. W.B.C. 10,000; H.b. 55%.

At 3 p.m., whilst asleep, he had a profuse perspiration. The temperature coming down to 97°F., pulse became uncountable for about 30 minutes; respiration came down to 24. After sponging and hot drinks and hot bottles, he felt much better. He recovered steadily from then onwards.

From then onwards, I tried intravenous brandy upon all pneumonias, bronchitis and septic pulmonary conditions.

I began to use 20 c.c. of 20% absolute Alcohol (Ethyl Alcohol) in normal saline instead of brandy shortly after this. From 1934 up-to-date, I have treated all my cases in this manner. After the introduction of the Sulphanilamide and Sulphapyridine preparations, I treated every alternate case with one of the preparations according to indications.

A preliminary note on pneumonia and the intravenous Alcohol was published in 1935; in this paper, I and my colleague, MAJOR ILLAHI BAKSH, Professor of Pharmacology at Lahore, acknowledged our indebtedness to LANDAU FIGGIN and BAUER for a reprint of their article published in 1931 on the same subject; this, they communicated personally as a result of certain questions we sent out to various centres. Previous to receipt of this article, we had used a 20% solution of Alcohol in saline in a variety of lung conditions. MAJOR BAKSH had used it on the medical cases under his care, and I had it in the cases of surgical chest disease, including post-operative lung complications under my care.

It is with the results of its use in post-operative lung complications that this article deals. The period of observation was from 1934 January to 1940 August.

Some figures may be of interest:—

1. Total number of operations performed under anæsthesia	...	9521.
Total number of lung complications	...	3946.
Percentage in occurrence of lung complications	...	31%.

Anæsthetics used:—

1. Ether and Chloroform	...	4474.
Lung complications	...	2810.
Percentage in occurrence of lung complications	...	62.8.
2. Spinal (Percaïne by Etherington Wilson Technique).	...	2370.
Lung complications	...	106.
Percentage	...	4.4
3. Local and Regional	...	1763.
Lung complications	...	27.
Percentage	...	1.5.
4. Basal	...	914.
Lung complications	...	103.
Percentage	...	11.2.
Avertin	...	89.
Lung complications	...	8.
Evipan	...	520.
Lung complications	...	43.
Paraldehyde	...	305.
Lung complications	...	52.

All patients of European race have been excluded from these figures.

The patients were mostly drawn from the peasant populations of the Punjab, the United Provinces, Bengal, Nepal and Orissa. Those living under Army conditions formed only a small part of the total, actually 1612 with a total lung complications of 201 or a percentage of 12.4.

The number of female cases was 2383, with a total lung complications of 491, or a percentage of 20.6.

A certain number of factors were common to the civilians and soldiers, the chief of which were: smoking, which always involves inhaling, chewing *pan*, signs of chronic nasal and pharyngeal infection, pyorrhœa, usually of a severe grade.

In the civilian group, pyorrhœa and mouth infection were always very severe; the soldiers were much cleaner. *Pan* chewing is mainly responsible for this state of affairs, the soldiers preferring the use of tobacco to *pan*.

Amongst the civilians a high incidence of chronic lung disease in the form of latent tuberculosis, healed tuberculosis, chronic bronchitis and asthma, was a factor not met with in the army group. Such cases were only operated upon if conditions made it absolutely unavoidable.

The types of pulmonary and bronchial complication encountered

were varied from minor degrees of tracheitis to lung abscess and recrudescence of an unsuspected tubercular infection.

Here, I shall only consider those occurring in the first three or four post operative days, accompanied by a rise of temperature, leukocytosis, cough and expectoration.

In this group three distinct types can be discovered clinically:—

1. Bronchitis.
2. Atelectasis.
3. Bronchopneumonia.

The occurrence rate in a total of 1523 lung complications untreated by Alcohol or Sulphanilamide was:—

1. Bronchitis	...	30%
2. Atelectasis	...	54%
3. Bronchopneumonia	...	26%

Every case, whatever its outcome as a lung abscess or tubercular process, could be classified clinically into one of these groups.

The characteristics used for their classification were as follows:—

I. Bronchitis.—Within 12 hours of operation, the patient begins to cough and with difficulty brings up a thick sticky yellow sputum, which under the microscope shows very few organisms of the cocci type and very few pus cells. The temperature is between 99° F. and 100.8° F. Physical signs are those of an early bronchitis or tracheitis without any sign of involvement of lung tissue.

From this condition, which every case showed at some part of its early career, two developments are possible. Atelectasis may occur; bronchopneumonia may occur. Atelectasis may be followed by signs of bronchopneumonia. Not all cases of bronchopneumonia, however, showed preceding atelectasis, but all showed the bronchial condition.

The percentages given above refer to cases which finished with a final diagnosis of bronchitis, atelectasis and bronchopneumonia.

Of the cases of atelectasis, all commenced as bronchitis. Of the cases of bronchopneumonia, all commenced as bronchitis; 24% showed the stage of atelectasis.

II. Atelectasis.—68% of the cases presented this condition at some stage of their progress. Evidently, in certain cases of bronchitis, the secretions were so sticky that they could not be dislodged from bronchi. Occlusion of one or more of the bronchi means collapse of the lung below. The amount of lung which must collapse before it can be detected clinically is unknown, but two obvious grades could be distinguished clinically amongst any group of cases. These were: the rare massive collapse with all its well-known severe clinical evidence and minor collapse. In the latter case, there appears, during the course of the post-operative bronchitis, a patch of silent lung with accompanying dullness to percussion. This area may be quite small, or, large enough to cause mediastinal displacement as evidenced by shift of the cardiac impulse and heart dullness. There may or may not be dyspnoea and cyanosis depending upon the amount of lung out

of function. The pulse rate rises, but the temperature shows no critical move such as might be expected if the patch were due to a spread of inflammation rather than to a purely mechanical cause. A large number of these cases, (over two-third), cough up a plug of secretion with immediate clinical relief and more or less immediate disappearance of the clinical signs.

III. Bronchopneumonia.—In only 2% of all cases, this process appeared to be present from the commencement of the lung complication. The remainder of the cases began as a bronchitis, which then showed atelectasis, followed by bronchopneumonia. The patches of atelectasis either did not clear or became more numerous. In those of longer standing than 48 hours, signs of pneumonia consolidation developed with rales in multiple patches throughout one or both sides of the chest. The patient's temperatures rose. Respiration rates increased markedly, and the pulse rate went up in accompaniment to the now toxic appearance of the patient. Once these signs were present, the patient's condition was serious, and the death rate in the series from bronchopneumonia was 32%.

Now, of the remaining 1523 cases of the total 3046 cases, 836 were treated with intravenous Alcohol, and 687 with Sulphanilamide, a Sulpo-pyridine. The remaining 1523 received the usual medical treatment of cough mixture, sedative followed by expectorant, with inhalations, etc. The figures for this series have been given above.

Intravenous Alcohol Series.—1. Total cases: 836.

2. *Technique:* As soon as bronchitis, however mild, was diagnosed, intravenous injections of Alcohol were commenced. Dose: 20 c.c.m. of 33% absolute Alcohol in normal saline per day. The solution was always prepared by mixing the Alcohol with the saline in the correct proportions and then sterilising the flask and the solution together, the neck of the flask being carefully plugged with cotton wool. The intravenous injection is given slowly—five minutes being taken to give 20 c.c. No other treatment was given except fluid replacement and restoration of bowel action. Effect: All cases showed a slight reaction in a rise of temperature with a slight feeling or chilliness about 20 minutes after the injection. During the injection, they actually mention the taste in their mouths and a slight burning sensation in the arm used for the injection. No case of thrombosis has been seen yet, even when a small amount of Alcohol passed out of the vein into surrounding tissues.

The further effects observed were:—(a) Any pain present in the chest or trachea disappeared within one hour of the injection. The patient was asleep in most cases within half an hour of the injection. (b) Cough diminished in every case after a slight increase during the giving of the injection. (c) Sputum decreased in amount, lost its yellow colour and its sticky character becoming thin and watery and easy to eject. (d) If atelectasis had developed signs, in most cases they began rapidly to disappear after the first injection. (e) Temperature, pulse, and respiration rate all steadily subsided in these cases which showed signs of bronchopneumonia.

The occurrence of the three complications under discussion in this paper was as follows under treatment by Alcohol:—

1. Bronchitis	... 90%
2. Atelectasis	... 7%
3. Bronchopneumonia	... 3%

In bronchitis, the duration of signs from the commencement of treatment was an average of three days.

The cases which showed atelectasis were cases which occurred so early in the post-operative period, and so abruptly that treatment had not yet been instituted.

The cases of bronchopneumonia were also cases which developed very rapidly in the post-operative period. No case of bronchitis had two days' treatment as such passed beyond that stage. No case of bronchopneumonia in this series died.

Sulphonamide Series.—(Many preparations of this drug were used; Prontosil, Urea Sulphazide, B. & W. & Co., Glaxo, etc., etc.)

Total cases : 687.

Technique.—A standard dose intramuscularly was given on diagnosis of bronchitis, followed by $7\frac{1}{2}$ grains, four times daily, by mouth. No other treatment was given except fluid replacement and bowel action maintenance.

Effects.—No reaction to injection ; chest or tracheal pain was not affected markedly before 48 hours of treatment. The consistency of the sputum remained unchanged. The cough was unrelieved. If atelectasis had developed, and the patient did not cough up the plug of sputum, the condition usually showed signs of bronchopneumonic consolidation. Over a period of five days, the average case cleared of bronchitis. Bronchopneumonia and atelectasis took from seven to ten days to clear.

The occurrence rate of the conditions (*i.e.* final diagnosis) in this series was:—

1. Bronchitis	... 47%
2. Atelectasis	... 31%
3. Bronchopneumonia	... 22%

No case of bronchopneumonia died.

These figures come between those of the series treated by ordinary medical methods and those treated by intravenous Alcohol.

It would appear, therefore, that a definite place may be given to Intravenous Alcohol Therapy in post-operative lung complications.

Summary.—Evidence is brought forward to support the use of intravenous Alcohol in the treatment of post-operative lung complications of the bronchitis, atelectasis, bronchopneumonia type and sequence. It appears to be more efficient in this type of case than any other form of treatment.

Reference :

1. Baksh, I. and Andreasen, A. T.—(1935)—*Indian Medical Gazette*, LXX, 675.

Fracture Rib with some of its Complications*

BY

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I HAVE chosen the above subject as every student like me must have found a series of cases of thoracic injury, both in hospital and during private practice. The usual incidence of this condition is during the rainy season, when the collapse of the "Kaccha House", the fall from the trees and the slippery roads provide for us ætiological factor of injury to the thorax. In addition, there are also a large series of cases, which I had the chance of studying, during the ravages of communal riots in the city. I feel that the various aspects of this lesion are not so commonly stressed in clinical practice and hence, I will try to give here a few of my personal observations in this connection.

Classification.—The clinical signs and symptoms are so commonly related to the mode of injury received on the thorax that the description of the clinical condition on the basis of ætiology seems perfectly justified.

A. Direct Trauma Fractures of the Ribs.—These are caused by "Lathi" blows or stab wounds on the chest or may be due to a fall from a height on the chest-wall. These are attended by :

- (a) severe shock
- (b) injury to the lungs and the other structures.
- (c) the fractured rib is usually of a compound variety.

There are certain cases in this group of direct trauma, where blows on the chest-wall have caused fractures of the ribs without the co-incidence of the above-mentioned points. This happens more commonly in elderly people, who have lost the elasticity of their thoracic cage due to secondary ossification and senility.

The diagnosis of these cases is easy and the complications almost always present render the treatment difficult and the prognosis less favourable than the second group of cases mentioned below.

B. Indirect Trauma Fractures of Ribs.—This is by far the commoner injury and is due to a compression of the chest-wall, either antero-posterior or from side to side, the former resulting in fractures more commonly. These cases are attended by the following diagnostic points.

- (a) History of being compressed and a sudden snap on the side of the chest-wall, usually affecting from the 4th to the 8th rib near its angle which is most vulnerable being the most convex part of the rib.
- (b) Patient may show signs of asphyxia.

* Specially contributed to 'The Antiseptic.'

- (c) Signs of shock and complications like injury to lung are rare.
- (d) These fractures are usually simple. The treatment is easy and prognosis better than the direct trauma type fractures. Clinically, the patient's main symptom is catching pain on the side of the chest during deep breathing, sneezing or coughing. Lying on the injured side relieves the pain.

C. Pathological Fractures.—I have changed the above heading from the fractures due to muscular action as commonly described, into pathological fractures because, I have not come across a case, where muscles alone were responsible for the fracture. The fracture takes place when the patient is undergoing senile degeneration of his thoracic cage or when he is suffering from insanity, G.P.I., rickets, or any other general wasting disease.

The clinical features of this fracture rib fall either into direct or the indirect type of cases and apart from the treatment of underlying pathological condition, treatment of the fractured rib as such is the same as in the direct or indirect trauma type of fracture.

There are three points which I would like to mention at the very outset :—

1. A fractured rib itself is not of much importance but for the various complications that it may give rise to.
2. Although there may be no signs of a fractured rib and the injury to the chest-wall may appear meagre, yet the intra-thoracic complications may be of a serious nature. Hence, every case of injury to the thorax should be carefully examined and the intra-thoracic complications kept in mind, although there is no fracture of the ribs.
3. Shock may be profound in thoracic injury and, I am afraid, this factor of shock is not duly accounted for, during treatment as should be done. Suffice it to say, that shock alone may kill the patient.

Signs and Symptoms.—The clinical picture is that of the history of an injury followed by sharp, catching pain in the chest-wall, localised tenderness and pain during breathing, sneezing or coughing. In the majority of cases, specially of the indirect trauma type, the diagnosis is based on local signs alone and I will mention here a few and their relative importance.

1. *Local tenderness* :—A very valuable sign easily detected on palpation. I do not think that the usual method of pressing the sternum towards the spine to detect local tenderness at the seat of fracture in ribs is so helpful as the simple palpation of rib.

2. *Swelling* :—This may be completely absent and even if present, is no indication of the damage underneath.

3. *Crepitus* :—It is easily detected by making the patient breathe and is a sure sign of the fractured rib.

4. *Deformity* :—An actual deformity of the chest-wall is detectable only when several ribs are fractured. In stout individuals and where only one or two ribs are broken, this sign is of no value.

5. *Radiological signs* :—X-ray examination is a useful confirmatory sign but is not necessarily required for diagnosis in large number of cases. The ribs are subcutaneous structures and their fracture is easily felt on palpation, but in fat individuals, X-ray examination is very useful.

Other signs of fractured rib are the signs of its complication and as such, the surgeon should look for hæmoptysis, pleurisy and hæmothorax. The existence of either of these is not alarming and majority of these cases properly treated recover well, except the group of cases where trauma has been caused by stab or gunshot wound.

The common complication which I have met with is post-traumatic bronchitis with its attendant cough, and it clears up easily on rest and expectorant cough mixture. Some surgeons advise injections of Ether and Olive oil in 1 cc. doses for this condition.

Empyema, tension pneumothorax, mediastinal flutter and suppuration, pneumonia, have all been mentioned; but, in my opinion, the following common complications should be borne in mind.

1. *Shock and respiratory failure* :—Injection of Morphia is of definite value in cases of thoracic injury.
2. *Cough* :—Post-traumatic bronchitis.
3. *Surgical emphysema* :—This is attended by shock and is common in the direct trauma type of case. It should usually be left alone, but if extensive, multiple needle punctures may be done or incisions made to let out the air. In one of my cases, the patient had a fall from a tree and came to me with a fracture, practically of all the ribs on the right side of the chest with surgical emphysema extending upto the gluteal region and the neck. A few hours later, the patient died, but I was impressed with the fact that emphysema was so extensive.
4. *Hæmorrhage* :—It may be large when intercostal vessels rupture or when the lung is pierced. The usual routine is to give conservative treatment and to put the patient on Morphia. Later on, operative treatment may be considered. Aspiration should not be undertaken unless 5 or 6 days have passed.
5. *Sepsis* :—Specially in compound fractures and where the pleura and lungs are damaged, every care must be taken in this respect.
6. *Fever* :—Cases of thoracic injury shoot up temperature very often, but one should not forget that they are often of no serious

import and disappear in a few days. Surgeon should not, therefore, be alarmed on account of this factor.

Rarer complications such as paralytic ileus, necessitating enterostomy, have been mentioned in fracture ribs, but I have not come across a single case of this nature in my series. Bronchial fistula has been met with in half a dozen cases of stab wound and reacted well to closure.

Sequelae:—Intercostal neuralgia and local pain due to a lump have been met with in two cases and were due to the extensive callus formation. They disappear in course of time.

Treatment of Fracture Rib.—Main Points:

1. In the *direct trauma* types of cases, treat the shock first. Operation should be undertaken to repair intra-thoracic damage and after closure of the wound, strapping should be resorted to. Morphia and asepsis are great helps to the surgeon.

2. *Indirect trauma* type of fracture rib are treated by the strapping of the chest-wall. The leucoplast strapping which is usually applied from below upwards, across the mid-line, both in front and back, during the phase of expiration, is not so efficacious unless a shoulder strap on the affected side is also supplemented. I have found a complete plaster girdle of Bohler, in the lower part of the thorax, supplemented by strapping, a very useful method of treating these cases.

The bandage should be kept on for a period of 3-5 weeks and the majority of cases unite easily. I think the spongy nature of the ribs and their great vascularity is responsible for easy union.

The above observations have been made on a series of 41 cases and I have tried to mention the salient points, which have struck me during my study of the subject.



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CASES AND COMMENTS

A Case of Acute Hæmolytic Anæmia of Lederer*

BY

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AND

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ACUTE Hæmolytic anæmia of Lederer is a rare disease, and rarely reported in the literature. So, we thought it relevant to record the following case.

We were called upon to see the eldest son of our colleague, aged about 12 years, on 24th August 1940, at about 11 p.m., who had been suffering from continuous fever since 5 days. There was an acute onset of fever, the temperature rose up rapidly to 104 degrees and was maintained there with a remission of about one degree in the morning. The patient consumed 4 tablets of Sulphonamide, two on the first day and two on the second day. On the third day, he was given 2 tablets of Arsiquin* with diaphoretic mixture.

When we saw the boy, he had a temperature of 104 degrees, pulse 100 per minute and respirations 30 per minute. The gums were swollen, spongy and bleeding. Tongue was coated. Heart and lungs were normal. Liver and spleen were not palpable. The patient was in a typical "typhoid state."

Since the 4th day (23-8-'40) evening, the boy was passing red urine. The colour was intimately mixed with the stream. There was no pain, nor was there any diminution in the quantity of the urine passed.

Treatment.—(1) *Diet*:—Milk 4 ozs., every 4 hours. Tomato juice and glucose water in plenty.

(2) R Pot. Citras	...	3	1
Soda Bicarb	...	3	1
Liq Amm. Acetatis	...	3	4
Syrup	...	q.s.	
Aqua ad	...	3	4

Fiat Mist., oz. one, every 6 hours.

(3) Calcium Chloride 5% 5 c.c., was given intravenously, twice on the 6th day (25-8-'40), but stopped subsequently.

(4) Cebion (Vitamin C of Merck's) 0.05 gms was given intramuscularly on the 7th, 8th, 9th and 10th days of illness.

(5) Cold sponging for hyperpyrexia, whenever found necessary.

* Arsiquin is a patent preparation of Continental Laboratories containing Quinine, Arsenic and Iron.

Progress.—On the 6th day of fever, the temperature shot up to 105.2° which, on cold sponging, came down to 101 degrees. On the 7th day morning, it came down to 98 degrees and subsequently, except for a temporary rise now and then, there was no fever. On the same day, it was noticed that the patient was definitely jaundiced. On the 8th day morning, the colour of the urine was a shade less and the sediment too was less. Autohæmotherapy 6 c.c., was given intramuscularly with the hope to desensitize the R. B. C., for hæmolysis to outside toxins.

By the 11th day, the urine had cleared completely. The swelling of the gums was still present, and they were not tender and did not bleed easily. On the 12th day, the boy was up on his legs the whole day. The liver was just palpable, on deep breathing, slightly tender, the edge was rounded and soft. There was tenderness on deep breathing in the splenic region, but the spleen was not palpable. By the 17th day, the jaundice had disappeared completely. A hæmic murmur had appeared in the pulmonary area, though there was no dilatation of the heart. Liver and spleen were not palpable.

By the 20th day, the swelling of the gums was very slightly present, and the mouth was healthy.

The boy was given injections of Campolon 2 c.c., on the 9th, 16th and 20th days. Iron was started in the form of scale preparation internally, from the 20th day. The convalescence was uneventful. The boy recovered completely by the 35th day of illness. The hæmic murmur had disappeared. The boy was in a position to attend the school regularly from the 40th day onwards.

Investigations.—25th August 1940; Urine—very turbid and of port wine colour; there was lot of sediment on standing; Specific Gravity—1016; Albumin—abundantly present; Bile salts—nil; Bilurubin—nil; Benzedene test—strongly positive.

Microscopic examination:—Lot of granular debris. Granular casts, epithelial casts and hyaline casts were present. Renal epithelial cells were present. A few R. B. C., were seen here and there, but the number was so few and proportionately very low when considered with the depth of the colour. A few discrete cocci were seen.

Spectroscopic examination of the urine:—Hæmoglobinuria was present.

Blood Counts:—27th August 1940; R. B. C.—2.45 millions per cubic millimeter; W. B. C.—22,800 per cubic millimeter; Hæmoglobin (paper-method)—45%; Colour Index—1.14.

Differential Count:—Polymorphs—56.7%; Lymphocytes—34.1%; Eosinophils—3.6%; Large lympho—1.0%; Myeloblasts—1.0%; Metamyelocytes—1.0%; Eosino-myelocytes—1.0%; Neutral myelocytes—1.0%.

Blood smear examination:—Anisocytosis, microcytosis, and few vacuolated R. B. C., were present. No parasites were found.

Van den Berg Test:—Blood was sent twice during the acute stage of illness for Van den Berg test. But the test could not be done as the serum was reddish in colour due to hæmolysis in vivo.

Blood Wassermann reaction:—30th Sept '40—Negative.

Fragility of R. B. C.—11th Oct. '40 Minimal Resistance 0.42% Nacl; Maximal Resistance 0.37% Nacl.

We considered that the case was one of acute hæmolytic anæmia of Lederer, for the following reasons:—

(1) The disease is common in the first two decades of life. Here, the patient was twelve years old.

(2) The disease was characterised by an acute onset, with marked rise in the temperature, and the clinical picture was that of an acute systemic infection. The patient suffered for 6 days with continuous fever, ranging from 103 degrees to 105 degrees, together with toxæmic kidney. The same toxins produced hæmolysis of R. B. C., with hæmoglobinuria and also affected the gums producing their swelling and easy bleeding. All these signs point to an acute systemic infection. Blood smear showed no parasites. We did not know the exact nature of the infection.

(3) Hæmoglobinuria was markedly present.

(4) There was a marked leucocytosis of 22,800 per c.mm. Immature cells were 4.6%—i.e., they were more in number than in a normal blood, both absolutely and relatively. Both these were characteristic of the disease under discussion. (Very rarely, leucopenia was known to occur in Lederer's acute hæmolytic anæmia.)

(5) Since it was a hæmolytic anaemia, there was hæmolysis in the blood stream, (the serum was found to be reddish in colour, twice during the acute stage due to hæmolysis in vivo) and there was hæmolytic jaundice.

(6) Anæmia might be microcytic or macrocytic in type. The colour index might be below the normal or above the normal but generally, it was found round about unity. In the case under discussion, the anæmia was a microcytic one with the colour index of 1.14.

(7) The disease would end either in complete recovery within a few weeks or in death. Here, the patient recovered within a few weeks.

(8) Treatment by transfusion was often said to be dramatically successful. In this case, there was no need at any time to do transfusion, and it was not done.

It was a point of interest to note that on two occasions, Van den Berg could not be done as the serum was macroscopically reddish in colour due to hæmolysis in vivo.

We would like now to discuss the differential diagnosis with particular reference to this case from other diseases that were likely to cause a certain amount of simulation to Lederer's anæmia.

1. **Acute Nephritis or toxæmic kidney:**—The same toxins that had caused hæmolysis of R. B. C., in the blood stream, had also damaged the renal epithelium, with the production of casts in the urine. So, the boy suffered from a concomitant toxæmic kidney. But the case could never be one of acute nephritis, for it could only cause

hæmaturia, but it could never cause hæmoglobinuria and hæmolytic jaundice, both of which were present in this case.

2. *Acute Scurvy*:—Here again, the simulation was very superficial. (e.g., bleeding gums.) But acute scurvy was rare in civil population, and that too at an age of 12 years. It was a disease of insidious onset. The social condition and diet of the boy did not suggest any vitamin C deficiency. Hæmoptysis, hæmatemesis, and hæmaturia, though rare, could occur. But scurvy could never cause hæmoglobinuria and hæmolytic jaundice.

3. *Acholic Jaundice*:—There was no familial history on the paternal or maternal side. Hæmolysis in acholic jaundice was not due to the presence of any hæmolytic toxin in the blood, but due to the fragility of R. B. C. In this case, the severe fever, the presence of toxæmic kidney together with hæmolytic jaundice, went to show that undoubtedly, there were hæmolytic toxins at work. There was no enlargement of the spleen. Presence of well marked polychromatophilia and basophil granules in the stained film—so characteristic of acholic jaundice—was absent in this case. Further, fragility of R. B. C. was within the normal limits.

4. *Black-water Fever*:—Black-water fever was the first to be thought of in the tropics when hæmoglobinuria was present. But the following facts would rule out such a diagnosis. (a) Hyderabad was not an endemic area for Black-water fever. (b) Black-water fever would occur in patients who were the subjects of chronic malaria. There was no malarial history in the patient. (c) The spleen and liver in Black-water fever were generally demonstrably enlarged and tender. Except for a transient enlargement of the liver, on about the 12th day of illness, liver and spleen were not palpable. (d) There was an absence of leucopenia and large mononuclear increase. On the other hand, there was a definite leucocytosis.

5. *Paroxysmal Hæmoglobinuria*:—(a) *Syphilis*:—The boy was a member of a family of three brothers and two sisters, and all of them were hale and healthy. There was no stigmata of congenital syphilis; nor was there any previous history of hæmoglobinuria. An attack was usually mild and would last just a few hours. The very serious course of the disease extending for over a week ruled out this possibility. Blood Wassermann reaction was negative.

(b) *Raynaud's disease*:—The absence of paroxysmal affection of the blood vessels of the extremities, characterised by syncope, active hyperaemia and later, by local asphyxia, ruled out Raynaud's disease. Raynaud's disease sometimes could produce hæmoglobinuria.

(c) *Angioneurotic oedema*:—There was no heredity which was an important factor. Angioneurotic oedema was so characteristic in the sudden onset and rapid subsidence of asymmetrical swelling that it was hardly likely to be confused with other swellings. Hæmoglobinuria was rare, and even if it occurred, was evanescent.

(d) *Chronic Acquired Hæmolytic Anæmia (Hayen-Widal type)*:—This rare disease would resemble acholic jaundice in symptoms except that the shape of the R. B. C., was normal, and the resistance

to hypotonic saline was not always affected. This was a chronic disease. It was a syndrome rather than a disease, and it might be produced by a variety of causes like syphilis, Hodgkin's disease, cirrhosis of the liver, and splenic anæmia—though it was of course a rare symptom in any of these diseases. Hæmolytic crises were more frequent, and paroxysmal hæmoglobinuria occurred even in non-syphilitic cases. Transfusion was dangerous in these cases, as it was often followed by a hæmolytic crisis.

It is this case, a simple hæmolytic crisis in the course of a chronic disease, need not produce such acute general symptoms. The acute onset of the disease, the high pyrexia with other symptoms of toxæmic kidney, and rapid subsidence of symptoms to complete recovery, would rule out this disease.

6. *Due to drugs*:—For example, Pot Chloras, Nitrites, Sulphonamide, etc.,

The patient consumed 4 tablets of Sulphonamide within the course of two days (One tablet B. D.). Doubts were expressed by friends whether the picture was completely due to Sulphonamide. 4 tablets in the course of 48 hours was too small a dose, but still there was no reason why such a small dose should not cause toxic symptoms in a susceptible individual—might be due to idiosyncrasy or allergy. Sulphonamide was excreted rapidly in the urine: and the excretion was complete within about 48 hours. In this case, hæmoglobinuria started 48 hours after the cessation of administration and continued for days afterwards. Sulphonamide would mainly act on the bone-marrow and would produce leucopenia, and, in severe cases, agranulocytosis, probably with aplastic anæmia. In the case under discussion, there was a definite leucocytosis of 22,800 and the differential count showed as much as 56.7% of polymorphs. Spectroscopic examination of the urine showed pure hæmoglobinuria. The acute onset of the disease with high fever and toxæmic kidney was more characteristic of a toxic origin of the disease than a drug.

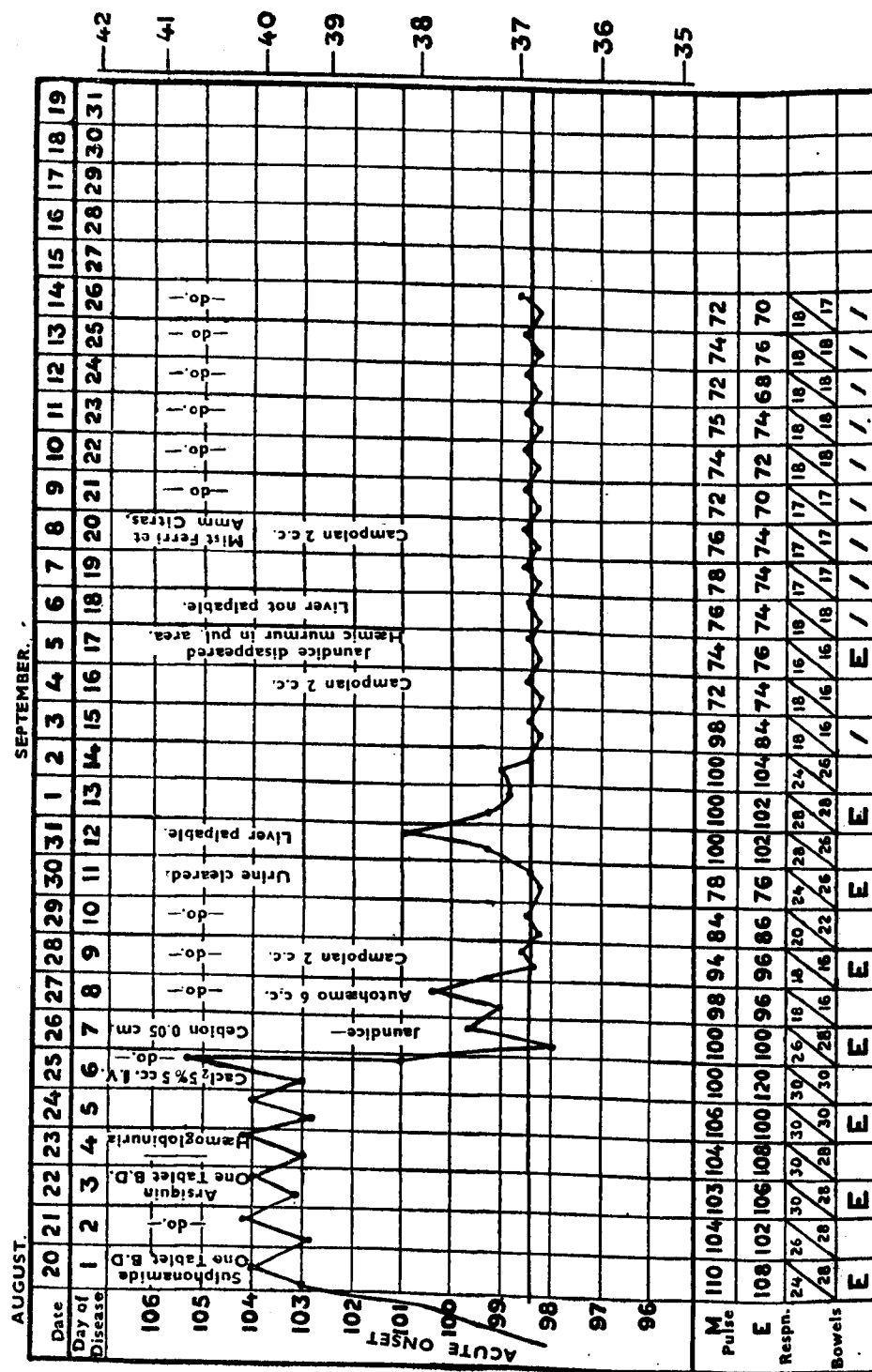
Among the toxic effects of Sulphonamide, methæmoglobinæmia and sulphæmoglobinæmia were not uncommon, producing cyanosis. Four cases of hæmolytic anæmias had been reported, possibly resulting from the drug (HARVEY and JANEWAY 1937) which recovered after transfusion with citrated blood. But nowhere we could come across in the literature that Sulphonamide could produce hæmoglobinuria.

7. *Acute Leukaemia*:—The fact that the boy recovered completely from his illness eliminated acute leukaemia. Acute leukaemia could cause sometimes hæmaturia but never hæmoglobinuria. There was leucocytosis; but the blood picture did not show the preponderance of immature cells i.e., myeloblasts or lymphoblasts which were so characteristic of leukaemia.

8. *Icterus Neonatorum Gravis and Winckel's Disease*:—Both were the diseases of the new-born, and were only mentioned here for completeness.

We wish to thank Dr. S. W. Hardiker M.D., M.R.C.P., for his valuable help during the preparation of this paper.

A Case of Acute Hemolytic Anæmia of Lederer—S. Venkateswara Rao.
TEMPERATURE CHART.



Two cases of Pneumonia Treated With Sulphanilamide

BY

H. Ghosh, M.B., M.S.P.E. (PARIS).

Visiting Physician, Chittaranjan Hospital, Calcutta.

Director, Dept. of Bacteriology, Indian Inst. for Med. Research, Calcutta.

PATIENT, K. C. R., a Hindu male, aged 36 years, complained of a bad attack of cold. On the third day of the attack of cold, in the noon, the temperature suddenly rose up to 104°F. with shivering. Patient complained of pain in the right side of the chest. He had two previous attacks of pneumonia of the right lung. Examination showed area of tubular breathing over the middle third of the right lung. One 5 grain tablet of Sulphanilamide was given at about 4 p.m. From 7 p.m., the patient began to perspire profusely. Another Sulphanilamide tablet was given at 7-30 p.m. Perspiration continued and the temperature came down to 102°F. at 10 p.m. Next morning, the temperature came down to normal, but the pain in the right side remained as before. Examination next morning revealed crepitant rales and friction sound over the same area. Another tablet of Sulphanilamide was given. There was no more rise of temperature though the pain, particularly intensified during breathing, remained the same. From the 4th day, distinct evidence of resolution was found. The patient was kept in bed for 11 days and had an uneventful recovery.

Patient, a male child, 10 months old. The child was brought to me by his father in the evening. Examination showed typical lobular pneumonia with a temperature of 104.8°F. He was suffering from cold and bronchitis for 3 days previously. The parents were extremely poor people and could hardly afford to buy medicine or to give proper nourishment. I was at a loss as to what I could do. I had a sample of Sulphanilamide—5 grain tablets—on my table. I crushed one into powder and made 5 doses out of the powder and advised the father to give one dose immediately and another next morning. At about 10 o'clock next morning, I was informed that the fever had subsided and the child took milk and barley water with relish. Three doses of Sulphanilamide were given during the day. In the afternoon, there was slight rise of temperature up to 101°F. But from the third day after Sulphanilamide treatment, there was no more rise of temperature. The child gradually recovered on the tenth day, and only a few moist rales could be heard on examination.

The important point of the first case was that the temperature came down in such incredibly short time after the beginning of Sulphanilamide treatment. For making the case note brief, I have not given the full details of the examination, though it was undoubtedly a classical case of pneumonia.

The second case note indicated how much helpful Sulphanilamide was in treating poor patients with pneumonia or broncho-

pneumonia. No other medicine except small doses of Sulphanilamide was given to the child.

From these two cases, the importance of Sulphanilamide in therapeutics may be realised.

A Case of Retinitis Proliferans

BY

K. S. Ghaswala, L.M.S., M.O.S.

Ophthalmic Surgeon "Dr. Ghaswala Eye Hospital", Bombay.

MR. N. G., a Hindu male, aged about 25, was seen by me on 8th of June 1940, with the following condition.

History.—Since about a fortnight, he has noticed that his vision in the left eye is failing. He believes that before this he always could see well with that eye. His sight is worst since last two days. No history of any specific disease or injury to the eye.

Present Condition.—Vision right eye: 6/6, left eye: fingers at about 8 feet; reaction and projection are good in B.E.; corneæ clear B.E.; lens, normal B.E.; lids, normal B.E.

Fundus:—Right eye normal.

Left eye shows the following changes:—1. On the upper and outer side of the disc, are small white patches covered over and also mingled with small hæmorrhages.

2. About half a disc distance above the macula, there is a sub-hyaloid hæmorrhage which is bounded at its lower part by a white patch of fibrous tissue.

3. From the lower and outer part of the disc, extends a white membrane which is vascularized and which runs into the vitreous. (retinitis proliferans)—(See Fig. I.)

Treatment.—As I was anxious to find out the cause of the hæmorrhages, I asked the patient to prolong his stay in Bombay but he would not agree to it and hence I prescribed him Mist H. P., with Pot. Iodide t.d.s, and asked him to see me again as soon as he possibly could.

I saw the patient again on 5th July 1940, when the changes in the fundus were as follows:—

Vision:—Right eye: 6/6; left eye: fingers at about 10 feet.

Fundus:—Left eye: On the upper and outer part of the disc is a bluish white membrane obscuring the vessels. Extending from this are three membranes, one going to the upper and outer side of the disc and forming a loop over which the retinal vessels pass (Fig. II). The other two membranes extend to the lower side of the disc—one downwards and inwards, and the other downwards and outwards (Fig. II).

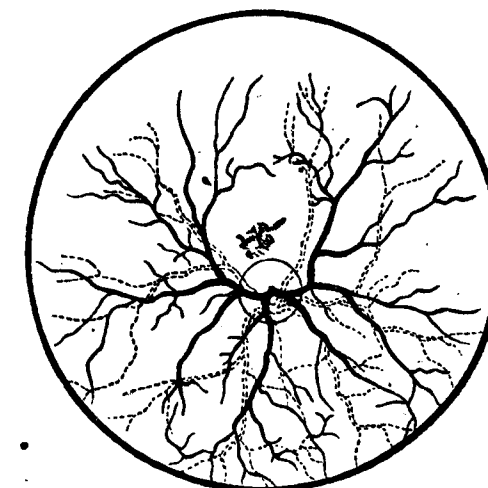


FIG. III.

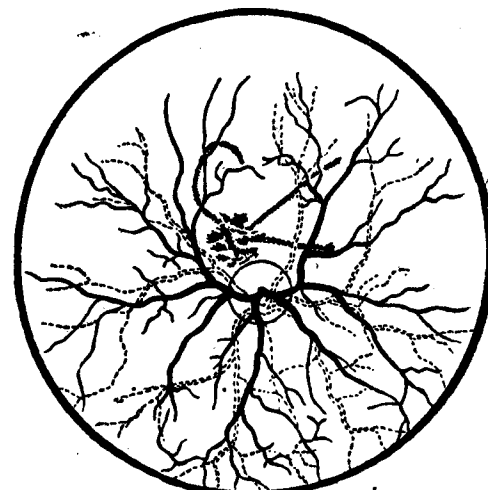


FIG. II.

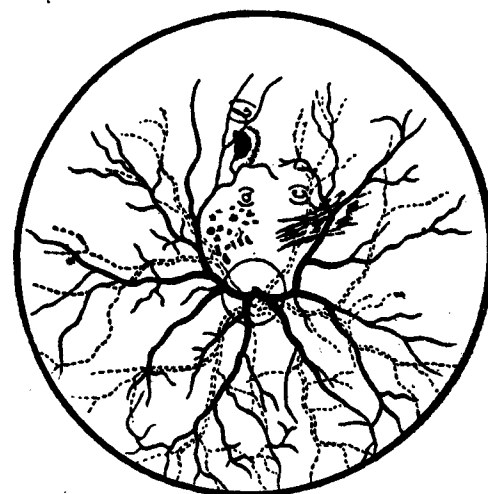


FIG. I.

A Case of Retinitis Proliferans—By K. S. Ghaswala.

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Fundus:—Right eye normal.

Left eye shows the following changes:—1. On the upper and outer side of the disc, are small white patches covered over and also mingled with small hæmorrhages.

2. About half a disc distance above the macula, there is a sub-hyaloid hæmorrhage which is bounded at its lower part by a white patch of fibrous tissue.

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There are now no hæmorrhages at any part of the fundus. That part of the fundus which was covered with hæmorrhages and white patches when the patient was first seen (Fig. I (a)), is now occupied by the irregular white membrane (fibrous tissue) and the place where the sub-hyaloid hæmorrhage was (Fig. I (b)), is now taken up by the membrane running in a loop and extending into the vitreous. The eye is also getting slightly divergent possibly from misuse.

Treatment.—Mist. H. P. and Pot. Iodide, t. d. s. internally as before.

The patient was seen again on 8th August 1940, with the following condition:

Vision:—Right eye: 6/6; left eye: fingers at about 12 feet.

Fundus:—Left eye, on the upper and outer part of the disc, (where the white patches with hæmorrhages were seen on the first examination and the bluish white membrane on the second examination) there is an irregular bluish white patch which extends about half an inch from the disc into the vitreous. This patch is now very much smaller than what was seen on the second examination.

There are no hæmorrhages or any other bands of fibrous tissue seen now. The fundus and disc appear as if they are seen through a fog and I find, this is due to very fine vitreous opacities.

Treatment.—As the patient was staying for some days in Bombay, I gave him a sub-conjunctival injection of Mercury Cyanide (1:2000) ms. vi and I am glad to say, when I examined him after a week, the vitreous opacities cleared up to some extent and the details of the fundus could be seen much clearly and not as if through a fog.

The last time that I saw the patient was on 11th October 1940, with the following condition:

Vision:—Right eye: 6/60; left eye about 12 feet.

Fundus:—The small irregular bluish white patch seen last is still there. I suggested another Cyanide injection but the patient refused and hence he was asked to continue the mixture.

In my opinion, this case clearly brings out the most important fact that retinitis proliferans generally follows a hæmorrhage which, of course, may be due to various causes but, in young persons, it is generally caused by syphilis, tuberculosis and injury.

On the first examination, there was seen a big sub-hyaloid hæmorrhage and other smaller hæmorrhagic patches at the upper and outer part of the disc. These were gradually replaced by fibrous tissue which extended into the vitreous. The last examination showed that most of the fibrous tissue is absorbed except a small patch on the upper and outer side of the disc (Fig. III).

In a strict sense, retinitis proliferans is not a retinitis but a proliferation of the connective tissue of the retina. It generally follows hæmorrhages, the masses of unabsorbed blood producing atrophy by pressing on the retina and causing proliferation of connective tissue. The retinal vessels either pass above or below the connective tissue. The prognosis is unfavourable.

Case Note on Ankylostomiasis

BY

S. P. Roy Chaudhuri, L.M.F., (BENG.)

Formerly, House Physician, Calcutta Medical School Hospital,
Medical Officer, R. D., Raj Dispensary, Kamtaul (Darbhanga).

I, DURING my stay in this part, had the opportunity of treating a number of ankylostoma cases. I took special care to study the symptomatology of these cases, from the very onset to the fully developed one. I have recorded my observations from about 500 cases, which I hope, will be of some interest to the readers of this journal.

I have divided my observations in a nut-shell, into three different stages:—

Preliminary Stage or Stage of Onset—

1. Headache specially frontal or hemicrania. 2. Pain in the nape of the neck. 3. Slight general weakness. 4. Burning of sole of foot and hand. 5. Sleep in some cases disturbed. 6. Scanty or stoppage of menstruation or, in some cases, excessive flow—in females. 7. Phosphoturia and spermatorrhoea in males recorded in some cases. 8. Eating of earth. 9. Pain in the epigastric region. 10. Constipation or diarrhoea or both alternately. 11. Sluggish action of liver. 12. Tongue slightly coated. 13. Appetite in almost all cases, normal in the very early stage.

Heart, lungs, liver and other organs on examination found to be normal.

Secondary Stage.—

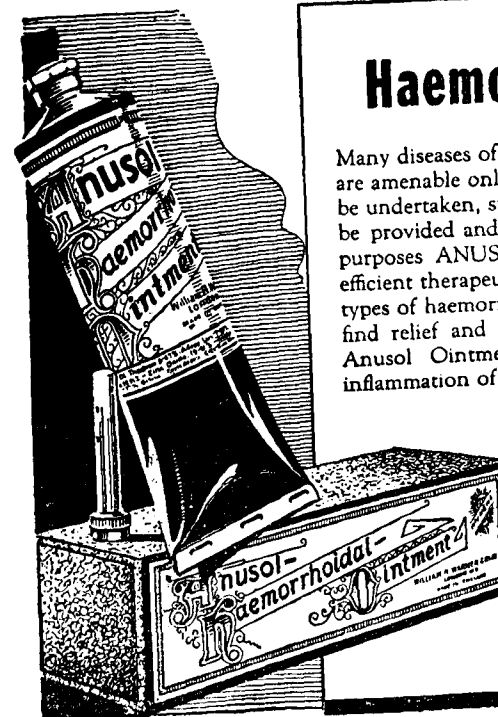
1. Headache or hemicrania—marked. 2. General weakness—increased. 3. No desire for any work. 4. Pallor. 5. Burning of sole of hand and foot increased. 6. Night blindness. 7. Voracious appetite, but digestive power less. 8. Pain in the epigastric region increased. 9. Craving for common salt excessive. 10. Vomiting and nausea in almost all cases marked. 11. Diarrhoea or constipation or both increased. 12. Jaundice found in 25% of cases. 13. Skin eruption noticed in 25% of cases. 14. Palpitation of heart. 15. Absolutely no desire for any work or movement; always prone to lie down. 16. Tongue flabby and pale and slightly pigmented. 17. Menstruation in females—stopped. 18. Complaints of nocturnal emissions in males recorded. 19. Even in these cases no emaciation is marked.

On examination of the heart, the cardiac sounds found to be abnormally loud and the second sound aggravated; lungs clear, liver in some cases slightly palpable, stool (on physical examination)—whitish or clay-coloured.

Late Stage or Fully Developed Stage.—

1. Headache prominent in 90% of cases. 2. Complaints of regional neuralgic pain in 50% of cases. 3. Extreme anaemia. 4. Debility. 5. Anasarca. 6. Skin eruptions prominent in 25% of cases. 7. Night blindness. 8. Tongue—white like blotting paper, flabby and in almost all cases pigmented. 9. Atonic dyspepsia and blood in stool in 50% of cases. 10. Severe diarrhoea in 10% of cases. 11. Pain in the epigastric region prominent. 12. No desire for food and work. 13. Even in these extreme cases, general emaciation is not so marked. 14. Palpitation of heart on slightest movement, and on auscultation, hæmic murmurs are to be heard. 15. Bronchitis in 25% of cases noticed. 16. Desire for taking common salt increased. 17. Total stoppage of menstruation in males. 18. Frequent nocturnal emissions in males marked. 19. Liver palpable. 20. Urine (on examination)—albumen and ex-phosphate present in almost 75% of cases. 21. Stool—white or clay-coloured. 22. Jaundice in almost 25% of cases marked.

N.B.—In all these stages, stool examination is the main guide for final diagnosis. When if stool is examined in the preliminary stage, innumerable ova of ankylostoma will be found.



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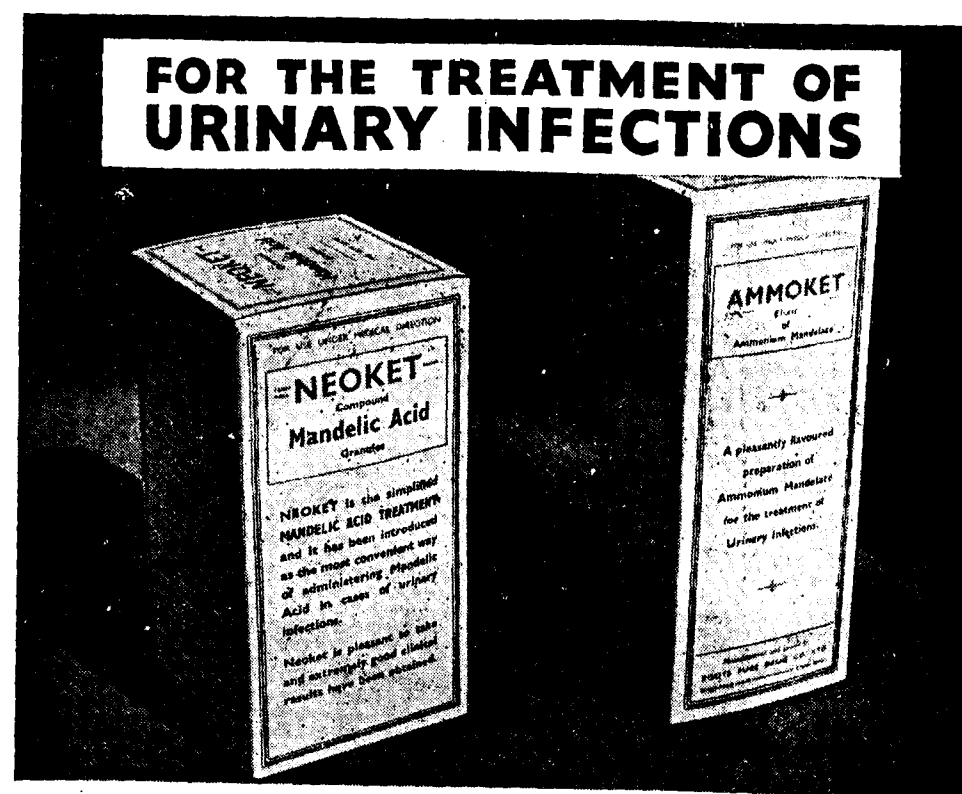
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EDITORIAL

The Indian Medical Council

THE recent session of the Indian Medical Council held at Delhi on the 26th of October 1940, was a momentous one; for, several far-reaching decisions had been taken so as to enhance the honour and prestige of the Council and at the same time raise the standard of medical qualifications in this country. When the Indian Medical Council Bill was in the Legislative anvil in 1933, the member in-charge of the Bill said that the aim of the Council was 'the securing of efficiency at home and honour abroad'. To-day, after six years of the working of the Council, we are constrained to remark that this aim has not been achieved. With regard to 'efficiency at home', it must be admitted that so long as the low standard of medical education in Medical Schools continues, efficiency is at a discount. It is only in the Province of Madras that the L.M.P. qualification has been abolished and a uniform standard of medical education has been set up, thanks to the wisdom and foresight of Dr. T. S. S. RAJAN, the ex-Public Health Minister. The other Provinces still cling to the old system and their Governments have not yet mustered sufficient courage to scrap the L.M.P. course with one stroke of the pen, as Dr. RAJAN did. Evidently, those Governments supposed to be national, are still being led by the noose-strings of the bureaucracy; otherwise, there can be no justification whatsoever for this hesitant policy on the part of these Governments, of which, Bengal is a notable example. The Indian Medical Council's decision in regard to this is really noteworthy and that is:

"That provision should be made for an All India Medical Register which should include persons holding qualifications prescribed in the Medical Council Act 1933, and persons who possess qualifications granted by examining bodies in British

India other than the Universities on December 31st, 1947 and whose names are on the Provincial Medical Register on that date".

The Council urged the Central Government to take early steps to implement these proposals and to ask the Provincial Governments to abolish medical schools for licentiates or to raise them to a University standard, so that there would in future be only one uniform standard of medical education for the whole of British India. This is a bold step which the Council has taken and such a step was made possible only under the inspiring leadership of Dr. B. C. Roy, as the President of the Council. We hope, the Central Government will not find some loophole or other to over-ride the decision of the Council and in effect, nullify its considered opinion, emanating from medical men of wide knowledge and ripe experience.

With regard to 'honour abroad' of the Indian Medical Council, it is distinctly at a discount. The only thing which helps to maintain its honour in the eyes of the Medical Councils abroad is 'reciprocity' and if foreign Medical Councils refuse to have direct relations with the Indian Medical Council, but will have reciprocity only through the General Medical Council of Great Britain, then certainly, the Indian Medical Council has only a subordinate status and does not hold an equal rank with other Councils of the British Empire or foreign countries. Dr. B. C. Roy's observations on this point tell a sorry tale:—

"We cannot say that we are satisfied with the present state of affairs in this regard (in securing honour abroad), although this Council is not primarily responsible for it. To my mind, I have no doubt whatever that with increased efficiency in teaching, our graduates will soon succeed, by engaging in advanced studies and deeper research, in achieving glory for this country and honour abroad. But, I also recognise that meanwhile our graduates desire to resort to foreign countries for higher education or for earning their livelihood and they expect them to secure for them facilities for either, by negotiating with these countries for mutual recognition of degrees as is provided for in the Act. For this purpose, the Council approached 27 countries, asking them to enter into schemes of reciprocity with us. Many did not reply, four of them agreed in the first instance to reciprocate directly with us, though two of them subsequently withdrew and 14 countries intimated that they would recognise our degrees only so long as they continued to be recognised by the General Medical Council".

This scheme of reciprocity is, what Dr. Roy calls, "indirect reciprocity", which has been in vogue since 1937, as the Council felt that some form of reciprocity was necessary to enable it to help those who were in need of such help and thus save its face.

Thus, our opinion of this Council, expressed oftentimes in 'the Antiseptic', that it will constitute 'a grand appendage' of the General Medical Council of Great Britain, has been amply proved.

In order to overcome this difficulty, the Council has passed the following resolution:—

"The Council resolves that in view of the difficulties that have been experienced in the working of the Indian Medical Act, 1933, it is highly desirable to take steps to constitute a general Reciprocity Board, for purposes of facilitating reciprocity between India and the various countries comprising the British Commonwealth, which desire to enter into such common scheme in the matter of mutual recognition of medical qualifications of the respective countries, and to approach the Central Government to take the necessary steps in this direction".

The absence of an All-India Register of medical men is the greatest drawback and so long as this drawback continues to exist, no direct reciprocity with foreign countries is possible. If an All-India Register comes to be maintained, the Licentiates must perforce find a place there. If the Licentiates are there, the General Medical Council of Great Britain itself may not recognise the Indian Medical Council. Naturally, all the Councils of the British Dominions and other foreign countries will withdraw from the field and even this indirect reciprocity will vanish. That is the crucial time for the Indian Medical Council and the question for it to decide then will be—'to be or not to be'. Another bold step must be taken if it wants to exist, i.e., to refuse recognition of foreign degrees. This, however, is not possible so long as the Central Government is what it is at the present day, a subordinate of His Majesty's Government. The other alternative is to abolish the Council altogether, which is not possible either. What the future of the Indian Medical Council will be, time alone can tell.

GLEANINGS FROM MEDICAL PRESS

Medicine and Therapeutics

Modern Views on Tuberculosis in Childhood.—J. C. SPENCE, Practitioner 142: 421 (April) 1939.

It is now a generally accepted opinion that tuberculous infection in childhood occurs most commonly through inhalation of tubercle bacilli air borne from infected sputum. The younger the child the more likely is this to be true.

The small subpleural lesion which forms at the site of implantation of the primary bacilli is called the primary focus. From this focus bacilli pass along lymphatics to corresponding glands at the hilus of the lung. These glands have a strict anatomic arrangement and, according to their site, are called the broncho-pulmonary glands, the tracheobronchial glands or the paratracheal glands. The primary focus, the tuberculous lymphangitis and the caseous condition of the hilar glands are called the primary complex. While the primary focus

is usually in the lung, it at times may be in the abdomen, in the pharynx or, on rare occasions, in the skin, each being revealed at the site of infection by enlargement of the neighbouring glands.

In most adults who have been primarily infected in later childhood or in adolescence, the infection does not pass beyond the stage of the primary focus or primary complex. It heals readily without recognized disturbance of health. Not always is this so. In some children there will be recognizable disturbances of health about six weeks after the primary infection. Two of these disturbances are identified, *viz.*, a benign fever, which lasts about a week, and erythema nodosum. The latter is called primary tuberculous erythema nodosum to distinguish it from other forms of erythema nodosum which may occur later in the course of the disease or be caused by streptococci or other infections. When these clinical manifestations of primary tuberculous infection appear, a tuberculin test of the skin will show a highly positive reaction, and a roentgenogram of the lung may reveal an abnormal shadow.

At this stage the lesions of the primary complex, *i.e.*, the primary focus, the tuberculous lymphangitis in the lung and the caseation of the hilar glands, may heal and throughout the remainder of life cause no further trouble. If this does not take place immediately, there may be local spread of the disease in the lung or dissemination of the disease to other parts of the body. If this happens, the more familiar field of the well known forms of childhood tuberculosis is entered. In the lung a caseous bronchopulmonary gland may ulcerate into a bronchus to cause bronchopneumonia. Depending on the nature of the gland material passing into the bronchus, this bronchopneumonia may show itself by an active febrile disease with severe symptoms or an afebrile benign infiltration of the lung, revealed by an impaired percussion note and a pulmonary shadow in the roentgenogram. The latter is the clinical picture to which the name of epituberculosis is given. Caseous glands, without ulcerating into the bronchi, may compress them to produce areas of pulmonary collapse and a characteristic type of wheezing. Roentgenologic examinations are essential for the diagnosis and interpretation of these different clinical forms of pulmonary tuberculosis in childhood.—*A.J.D.C.*

Vitamin-A Therapy in Jaundice.—The liver is the main store of vitamin A in the body and it has been shown that night-blindness, which is due to vitamin A deficiency, is a frequent symptom in jaundice, and also whereas vitamin A, even when administered in large doses, is not present in the urine of normal individuals, partial elimination in the urine does occur in patients with hepatic diseases. These facts are pointed out by M. SALAH (*Journal of the Egyptian Medical Association*, March 1940, 23, 153) who has used intensive vitamin A therapy in three cases of parenchymatous jaundice with night-blindness, and in one case of chronic obstructive jaundice of two years' duration with night-blindness and marked xerophthalmia of the

conjunctiva and cornea. The daily doses given in the three parenchymatous cases exceeded 70,000 units by mouth. The night-blindness disappeared completely in five, five, and six days respectively, and the jaundice and disturbed liver functions improved. In the obstructive case the patient was put on a carbohydrate diet and given 1 c.cm. of a vitamin A preparation intramuscularly daily. The night-blindness disappeared in two weeks, the xerophthalmia in three weeks, and the jaundice and liver function improved. The author concludes by stating that treatment by massive doses of vitamin A is indicated in cases of chronic obstructive jaundice and also in parenchymatous jaundice of some duration. When steatorrhœa is present parenteral administration is recommended.—*Practitioner*.

Disinfection of the Throat.—Oral hygiene is at all times an important factor in the maintenance of good health and for the prevention of throat infections, but at the present time, with the increased danger of droplet infection owing to troop movements, evacuation, and the arrival in this country of large numbers of refugees, it is an essential. For this reason the tests carried out by HELEN P. GOODRICH and G. L. WAY (*British Medical Journal*, May 11, 1940, 1, 768), to determine the efficacy of saturated solutions of Thymol and Iodine, are of particular interest. *Thymol* is a well-established remedy, and is cheap and easily prepared. The crystals can be enclosed in a piece of muslin and placed in a bottle of cold water, the bottle being refilled with cold water when the solution is used. By this means, a saturated solution is procured. It must be borne in mind, however, that the solubility of the substance rises rapidly with the temperature, and for this reason a *really cold* solution (0.05 to 0.06 per cent.) is much weaker than one prepared in a warm room. When required for gargling the solution should be diluted with warm water according to the individual taste, but it should not be strong enough to "bite" the tongue. It is interesting to note that the addition of glycerin, although necessary when Thymol is employed as a throat paint, does not increase but rather decreases the antiseptic properties. *Iodine* in conjunction with glycerin is also much used as a throat paint, and the authors' findings concerning the use of Iodine alone in solution form indicate that it possesses a strong bactericidal action when thus employed. A weak solution of Iodine (0.01 per cent.) (1/100 the strength of Lugol's solution) is a useful medium for oral hygiene. In water alone Iodine dissolves only to the extent of 0.017 per cent. at 10°C., and the saturated solution can be kept ready, and diluted with warm water when required for gargling.—*Practitioner*.

Peri-Sympathetic Injections of Alcohol in Asthma.—Satisfactory results obtained in seven refractory cases of severe asthma by the peri-sympathetic injection of absolute Alcohol are recorded by H. M. WILENSKY (*Canadian Medical Association Journal*, July, 1940, 43, 59). Briefly, the method used was as follows:—The patient sits with knees flexed and the hands reaching beneath the knees so that

the spine is arched backward and the scapulæ are retracted laterally. A point is chosen 4 cm. from the spine over the lower border of the rib above the interspace through which the injection is to be made. A few drops of Novocain 2 per cent. are injected intradermally to raise a wheal, and then a long security needle is introduced perpendicularly to the inferior margin of the rib and directed downwards at an angle of 45° forward and inward for a distance of about 4 to 5 cm. The needle is then pushed a further 0.5 cm. toward the spine and about 2.5 c.cm. absolute Alcohol is injected. Confirmation of the correct site for injection is obtained by the occurrence of a sharp pain starting two or three interspaces below the site of the injection and radiating forward around the chest. Two or three nerves can be injected at one sitting, but this depends on the amount of pain or shock produced. Possible complications of the procedure are the radiating pain already referred to, shock, injury to the pleura resulting in the production of pneumothorax, and a mild form of neuralgia along the site of innervation. The radiating pain may last for about thirty or forty seconds, the shock for fifteen or thirty minutes, and the neuralgia, which can be relieved by 5 grains of Acetyl-salicylic acid, may persist for several months or even a few years. In bronchial cases with much sputum, an increase in the amount of sputum may occur for a few days following the treatment, but this gradually and progressively decreases. If any doubt exists concerning the site of the needle in relation to the pleura the needle may be connected to a manometer on a pneumothorax machine for the ascertaining of any respiratory excursions.—*Practitioner.*

Vitamin C in Acute Infectious Diseases.—SZIRMAI investigated the therapeutic value of vitamin C in toxic diphtheria, in typhoid and in pneumonia over a period of three years. In toxic diphtheria with oedema of the mucous membranes the death rate was greatly reduced when, in addition to the large doses of serum, Ascorbic acid was given. As a rule, 300 mg. of Ascorbic acid was administered intravenously, simultaneously with the serum, but in a separate syringe, so as not to impair the antitoxin. When intravenous injection was technically not possible, the acid was given intramuscularly. The parenteral administration of 300 mg. of Ascorbic acid was repeated daily for from three to four days. In addition the patients were given from 50 to 100 mg. of Ascorbic acid by mouth three times daily for about a week. In mild typhoid, the patients were given the juice of two or three lemons daily. Patients with typhoid of moderate severity were given, in addition, 100 mg. of Ascorbic acid by mouth three times daily. Patients with typhoid in a severe form were given daily intravenous injections of 300 mg. for from four to five days. Under this management intestinal hemorrhages were almost completely prevented. In diphtheria and in typhoid, favorable results were obtained even when the doses were not sufficient to produce saturation. In pneumonia, however, the deficit of vitamin C had to be completely compensated before therapeutic results could be noted. Children with lobar pneumonia were given intravenous injections of 300 mg. of Ascorbic acid

once or twice daily. According to the literature from 2,000 to 3,000 mg. is necessary to produce saturation in pneumonia patients. The author emphasizes that the mode of action of Ascorbic acid in acute infectious diseases has not been explained and that therefore the Ascorbic acid itself rather than its neutralized solutions should be administered.—*J.A.M.A.*

Histaminase for Urticaria.—LAYMON and CUMMING used Histaminase in treating seventeen cases of urticaria, two of urticaria factitia and eight of atopic dermatitis. These cases had proved refractory to all other types of treatment. In the cases in which Histaminase was administered, no other treatment was given. In most instances Histaminase was given by intramuscular injections from one to three times a week as well as two or three tablets three times a day by mouth. There were no unfavorable reactions to the drug. Ten cases of urticaria were clinically cured. The duration of treatment varied from four days to three weeks. The average time for cure was 10.7 days. Two patients improved. One patient had urticaria for nine months and was 50 per cent. improved after three weeks of treatment. Another patient had urticaria for several years and was 90 per cent. improved after two months of treatment. The duration of the urticaria in the five cases in which improvement did not occur was from several weeks to three and a half years. There was no improvement in the two cases of autographism. No definite improvement was experienced in any of the cases of atopic dermatitis, although one month's trial of Histaminase was given. From the results in their few cases the authors feel that Histaminase is a useful adjunct to other therapeutic measures in urticaria. The nature of whatever antiallergic properties Histaminase possesses are as yet not known. It may be that Histamine is inactivated.

Surgery

The Acute Abdomen in Childhood.—HERZFELD; Edinburgh M. J. 46: 750 (Dec.) 1939.

HERZFELD relates experiences in the Hospital for Sick Children, Edinburgh, during the previous ten years. Among 4,741 newly admitted patients there were 753 children (16 per cent) who underwent abdominal operation. Appendicitis was found in 498 of them; intussusception, in 107. The next two common diseases proved to be abdominal tuberculosis, in 43, and peritonitis, in 32. This leaves 73 children with less common conditions, which the author enumerates.

HERZFELD states that appendicitis is relatively as frequent in children as in adults. Perforation and early peritonitis are not unusual in children whose symptoms date back only twelve to twenty-four hours, and 71 per cent of all the patients with these conditions require drainage. If the temperature rises to 104°F. or above, the presence

of appendicitis can usually be excluded. The mortality rate for this disease is 2.4 per cent for the entire period of childhood.

Intussusception occurred in the first two years in 81 per cent of the children with this condition. It occurred in twice as many boys as girls, but the death rate in girls was twice that in boys. The author emphasizes the fact that the first stools after the onset of symptoms may not contain blood, the appearance of which may be delayed several hours. The early diagnosis should not be retarded for such a reason. In the first stage a barium sulfate enema may reduce the invagination, during which the barium sulfate can be seen by means of the fluoroscope to pass back through the ileocecal valve. However, operation is more certain, as it insures a complete reduction.

The 43 children with acute abdominal tuberculosis were admitted as requiring emergency attention, and these patients have been as frequent as formerly, while those with the chronic condition have become much fewer. It is difficult before operation to differentiate between acute appendicitis and tuberculosis of the ileocecal lymph glands. In tuberculous peritonitis a much more serious disease is encountered: the preliminary symptoms have been those of obstruction.

Primary peritonitis is relatively rare; of 32 infections, 20 were due to *Streptococcus*, 11 to *Pneumococcus* and 1 to *Staphylococcus*.—A. J. D. C.

Staphylococcic Infections of Kidney.—NESBIT and DICK state that certain features of acute staphylococcic infections of the kidney tend to obscure its early diagnosis. The condition is frequently not recognized and its complications—perinephric abscess and renal carbuncle—are rarely diagnosed until they have been present for some time. Eighty such cases seen at the University Hospital are discussed. The cases presented no apparent pre-existing infection of the urinary tract and were uncomplicated by obstructive lesions. The route of infection is hematogenous. *Staphylococcus aureus* is the most frequent invading organism, although any of the other strains of staphylococcus may be responsible. The port of entry is the skin or mucous membranes. Furuncles and carbuncles are the most common cutaneous foci, while infections of the upper respiratory tract are the most frequent mucosal precursors. In many instances no primary lesion can be demonstrated, suggesting that the port of bacterial invasion may be insignificant. The kidney is enlarged and multiple small areas of suppuration are disseminated throughout the cortex. The more extensive suppurative processes, which occur rarely, have been described as "abscess of the kidney," "septic infarct" and "renal carbuncle." The lesions heal rapidly unless extensive suppuration occurs. In all but seven of the eighty cases the onset was abrupt. Costovertebral pain of moderate severity, constant and aching, was present from the onset in all but three. If extremely severe, it simulated renal colic. Loss of appetite, malaise, general weakness, occasionally prostration and rarely nausea and vomiting were present. Chills occurred in forty-six. The

average temperature was 102°F. Leukocytosis was constant. Staphylococci are demonstrated in the urine by staining the centrifuged sediment. Their rapid disappearance has often led to confusion in diagnosis not only of simple coccic renal infection but also of its serious complications. Secondary invasion by the colon bacillus occurred from the seventh to the tenth day and persisted longer than the primary invader in twenty-nine of the eighty cases. With this invasion pus cells always appeared in the urine. The diagnosis is made without difficulty, except in rare instances in which the urine fails to show cocci for the first few days. In these cases costovertebral tenderness, fever and leukocytosis are diagnostic. Failure of diagnosis is generally due to failure to suspect the disease. The lesion most commonly confused with this condition is acute appendicitis, but the absence of nausea, vomiting and muscle spasm, with the presence of costovertebral tenderness and high leukocytosis, should be sufficient for differentiation. Acute hydronephrosis and cholecystitis must be ruled out. Uncomplicated staphylococcic renal infections run a stormy course the first week, followed by improvement of all symptoms and signs. Usually by the fourteenth day the temperature returns to normal and the patient is free from pain or tenderness. If symptoms and signs fail to subside or are accentuated, one of the surgical complications must be suspected. Uncomplicated cases end in complete recovery, except for cortical scars, which probably have no bearing on renal function. Patients with surprisingly serious infections without complications recover quite rapidly without operation. The nine patients with renal carbuncle were treated by operation; nephrectomy was performed on one and simple drainage on the others, with eventual complete healing in each instance. The forty-eight patients with perinephric abscess were all treated by incision and drainage. There were no postoperative deaths and no secondary nephrectomies. All pulmonary complications of renal or perirenal suppuration cleared up promptly on adequate surgical drainage of the subdiaphragmatic primary lesion.—J. A. M. A.

Local Implantation of Sulfanilamide in Compound Fractures.—KEY and BURFORD determined the effect of local implantation of crystals of Sulfanilamide in experimental contaminated fracture wounds in rabbits and dogs. They found that such implantation did not retard the union of the experimental fracture of one foreleg when compared with the degree of union present in a similar fracture in the other foreleg. Local implantation of Sulfanilamide crystals in compound fractures not only tends to lessen the danger of infection but does not perceptibly interfere with the union of the soft tissues or of the bone. However, such implantation does not permit the closing of grossly contaminated or infected wounds. The wound must be debrided in the usual way and all foreign material and devitalized tissue removed before the infection has gained a foothold and invaded the tissues, preferably within twelve hours after the injury. After the debridement and reduction of the fracture, the skin and subcutaneous tissues

are sutured with a single layer of silkworm gut without drainage in order to retain the serum which is saturated with Sulfanilamide. The authors believe that postoperative immobilization is an important factor in the prevention of infection. The upper limits of the method are not known but its routine use will enable the average surgeon to close with impunity most compound fractures. This is important not only in civil life but even more so in military surgery. Had the casualty wounds during the war of 1914-1918 been rapidly debrided sprinkled with sulfanilamide crystals, sutured and the reduced fractures immobilized in casts or splints, the large majority of them would have stayed closed without infection and the soldiers could have been sent directly back to America from the casualty clearing station or field hospital. The method would have brought about a great saving in hospital personnel and materials and the effect on the morale of the soldiers would have been unlimited. The method is recommended in clean operations in which the development of an infection is feared; that is, operations involving tissues previously infected and in which the infection apparently has disappeared. Good results have also been obtained in the wounds of amputation stumps when the operation was done for gangrene and infection.—(J.A.M.A.)

A Method for Continuous Spinal Anæsthesia.—WILLIAM T. LEMMON describes in the *Annals of Surgery*, January, 1940, a method for continuous spinal anæsthesia which has been employed in 200 cases without a single failure. Analgesia has been satisfactory, and the operation has been completed under spinal anæsthesia in every case in this series. Analgesia has been maintained for as long as 4 hours.

Novocain has been routinely employed because it is the least toxic of all drugs used for spinal anæsthesia. A concentration of 100 mg. per cc. of spinal fluid has been used for the initial injection and for all subsequent injections necessary during the operation. The so-called "toxic effects," which are always most pronounced following the first injection, are prevented by the use of 10 per cent. glucose by continuous venoclysis. The systolic blood pressure has not dropped below 80 mm. of mercury and it has not been necessary to administer Adrenalin or Ephedrine in any case.

The equipment needed to administer repeated injections into the spinal subarachnoid space, during surgical operations, consists of: (1) A rubber covered pad or mattress 5 inches thick, 18 inches broad, and 6 feet long with a gap 7 inches in length that is beneath the lumbar spine when the patient is supine. There is a break in the centre of this pad so that the lower part may be detached when the patient has the legs in stirrups for perineal operations. (2) No. 17 and 18-gauge malleable spinal needles of 2½, 3, and 3½ inch lengths. (3) Rubber tubing 36 inches in length with a small lumen, designed so that 2 cc. of spinal fluid will fill the tube and force out the air. (4) Stopcock. (5) Luer-Lok connections. (6) 10 cc. syringe.

We withdraw 6 cc. of fluid at spinal puncture and use this to

dissolve 600 mg. of Novocain. The trocar is then inserted into the spinal needle and the patient turned on his back. The needle lies in the gap of the pad. The syringe, containing the Novocain solution, is connected to the spinal needle with the stopcock in place. The tube is filled with 2 cc. of the solution to displace the air. The initial injection is then made and the stopcock turned to prevent escape of spinal fluid. Subsequent injections are given as they are required to maintain the anæsthesia at the desired level.—(General Practitioner.)

Aloes in the Treatment of Burns and Scalds.—J. E. CREWE says in *Minnesota Medicine*, August, 1939, that he has found the use of Aloes in the treatment of burns very satisfactory, obviating many of the disadvantages of the use of Tannic acid. In the period in which this treatment has been used, no cases have been of sufficient severity to endanger life, but from the results obtained, this method is applicable to more extensive burns.

The active ingredient of the ointment is Socotrine or Barbados Aloes. The ointment is made by mixing 2 drams of powdered Aloes and about 2 drams of mineral oil in an ounce of white vaseline. The affected area is cleaned thoroughly, and in some cases when it is badly soiled a preliminary application of warm moist dressings is made. If the burned area is clean but a greasy substance has been used prior to this form of treatment, it is not necessary to remove all of the grease as it will mix with the ointment to be applied. Serum is evacuated with a hypodermic needle from any blister present and a small amount of Mercurochrome is injected into each collapsed vesicle.

When this preliminary treatment of the burned area has been completed sterile gauze sufficient to cover the area is laid on a sterile towel and is covered with a layer of ointment at least 1/8th inch thick. The dressing is laid, ointment side down, on the burned area and is held in place by bandages. The dressing is not removed for 2 days. At that time the entire dressing can be removed easily, as there is no sticking from dried serum or dried blood. The surface of the wound does not bleed but has a clean glazed appearance. Another dressing prepared as before is applied; each dressing is allowed to remain in place for 2 days. Usually from 4 to 6 dressings of Aloes ointment will be required. Then zinc stearate or some other bland dressing may be used.

This technique has given very adequate results. Healing is rapid. Aloes apparently possesses some enzymatic action, as pus is digested from purulent surfaces. Infections have been negligible and there have been no unpleasant effects.—(General Practitioner.)

Relapses After Sulfonamide Treatment of Gonorrhea.—

COKKINIS and McELLIGOTT find that late relapses of gonorrhea after apparent complete cure with Sulfonamide derivatives occur frequently. They studied the records of more than 1,200 male and 200 female patients treated with Sulfonamide compounds from six months to two years previously. The analysis reveals an incidence of late relapses sufficient to render unreliable any statistics of results based on a relatively short follow-up. The term "late relapse" is used when symptoms return three weeks or more after a successful Sulfonamide course and after at least one negative series of tests. Of the total 1,268 male cases of gonorrhea treated, 263 either failed to respond to the treatment or were not seen again before tests of cure were carried out. Of the remaining 1,005 patients who remained well more than three weeks after their last Sulfonamide course and who passed one or more series of tests of cure, 118 (12 per cent) have returned with late relapses (112 with one relapse, five with two and one with three relapses). This 12 per cent is not an accurate estimate of the true relapse rate, as a large number of the 1,005 patients defaulted during the follow-up, and some of these must have relapsed subsequently. The 118 relapses are in the authors' opinion all genuine relapses. Another 100 of the 1,005 patients also returned with gonorrhea in the same period: of these, eighty-seven had definite reinfections, while the other thirteen might have had relapses or reinfections. A special analysis of the material shows that: 1. The incidence of late relapses does not vary with the individual Sulfonamide derivatives. 2. There is a fall in both early and late relapses when the chemotherapy is delayed until after the first week of symptoms, definitely so in the Sulfanilamide treated group. 3. Adjuvant treatment (vaccine) appears to decrease the relapse rate. 4. Apparent rapid cure does not decrease the incidence of relapse. 5. As patients with relapses are more likely to return at a late stage of the follow-up than unrelapsed ones, it is likely that in actual fact there is a gradual fall in the chance of relapse with the passage of time. 6. Gonococci were present in 81 per cent of late relapses treated in the first two weeks of gonorrhea and in 36 per cent of those treated at a more chronic stage. These figures are based mainly on the results of smear examinations. The use of culture studies may have shown gonococci in many more instances of negative urethral or prostatic smears. 7. The many late relapses throw considerable doubt on the reliability of provocative and other tests of cure in cases treated by chemotherapy. The fact that relapse occurred in 118 of their cases after successful passing of at least one series of tests (seventy-one of them passed two or more) indicates that negative tests are not proofs of cure in cases treated by chemotherapy. And yet the fact that 20 per cent of the late relapses were definitely provoked by vaccine, bougie or Alcohol from three to six months after apparent complete cure shows that these tests are still of value but that great caution should be exercised in their interpretation. The authors stress the value of repeated examinations (including culture) of the prostatic secretion, as they believe that many post-Sulfonamide relapses are

started by gonococci in the prostate which were rendered only temporarily inactive. A negative gonococcus complete fixation test does not always mean that a patient is cured. Sixteen of the 210 women with gonorrhea had late relapses. On the whole the figures for them are a little more encouraging than those for the men.—*J.A.M.A.*

PROCEEDINGS OF SOCIETIES, ASSOCIATIONS, ETC.

The Medical Practitioners' Association, Nuzvid.

The meeting of the above Association was held on 27-10-'40 at Nuzvid, in the Government Hospital premises, with Dr. V. Ananthachari in the chair. The following cases were reported and discussed:—

(1) A girl of 8 years suffered from chronic malaria and mumps and was on the way to recovery to normal health under his treatment. Suddenly, the parents noticed, within a space of 48 hours, the girl developing hoarse voice with a nasal turning and interrupted articulation of speech as though due to adenoids and nasal polypi. One E. N. T. specialist was consulted who suggested an operative interference for 'chondromatous growth' which, in his opinion, was the cause of nasopharyngeal obstruction. The girl had to be subsequently taken to Bangalore where she was advised to take Benerva tablets which, after a period of one month, relieved the girl of all the symptoms mentioned above.

(2) A case of chronic cystitis (pyococcal) with acute exacerbations in a male of 35 years that is coming round under intravenous Iodine and bladder washing.

(3) A case of hysteria in a female that manifested opisthotonus and treated successfully by intravenous Acid Hcl 1 in 1500.

The next meeting was held again in the Government Hospital, Nuzvid, on Sunday, the 24th Nov. '40 at 4 P. M., with Dr. S. S. Rama Rao in the chair. The following were the cases that were discussed:—

By Dr. V. Ananthachari:—A case of mercurial neuritis in a multi-para resulting from the routine domestic habit of administering 'Rasam' (crude Calomel or even Mercury Perochloride) during confinements and cured by Contramine.

By Dr. S. S. Rama Rao:—A case of syphilis and leprosy combined in a male whose urine revealed loaded sugar.

By Dr. N. Rama Rao:—(1) A case of imperforate anus in a child of 7 months in whom the faeces are expelled through urethra by the formation of recto-vesical fistula. The anus was created by operation and the child is regularly having motion through the anus and he said he had to watch how far the recto-vesical fistula would be closed. (2) A peculiar case of sudden spontaneous bleeding simultaneously from different spots over the body like palms, soles, chest and legs etc. which occurred intermittently and regularly on a particular day of the week in a male of 45 years. The patient exhibited

vertigo, dimness of vision and tremors of the body before, during and shortly after this occurrence. No bleeding spots could be detected even under a magnifying lens. He said it was probably a case of purpura hæmorrhagica.

The meeting closed by 7 P.M. after discussion of the above cases along with some more of professional interest.

The South Kanara District Medical Association.

The 10th Annual General Meeting of the South Kanara District Medical Association was held on 23-11-1940 in the Canara High School, Mangalore. Captain W. E. Mascarenhas, President, occupied the chair. The annual report with audited statement of accounts was read and adopted. For the first time since the starting of the Association, the General Body elected the following Honorary Members—all belonging to the District, who have made a mark for themselves in their career, highly respected both by the public and the profession.

(1) Dr. U. V. Nayak, M.B., B.S., Ph. D. (Lond.) (2) Lt. Col. V. R. Mirajkar, I.M.S., F.R.C.S., O.B.E. (3) Capt. M. G. Kini, M.Ch., F.R.C.S. (4) Dr. M. B. Prabhu, M.B., B.S., M.M. (5) Dr. U. Rama Rau. (6) Rao Bahadur M. Keshava Pai, M.D., O.B.E. (7) Dr. V. Rama Kamath. (8) Dr. P. Venkatagiri, M.D. (9) Dr. G. R. Dinkar Rao, M.D. (10) Rao Sahib Dr. B. Colaco. (11) Dr. L. P. Fernandes, B.A., L.M. & S. (12) Dr. S. R. Pândit.

After tea, the toast was proposed by Dr. M. Umesha Rao, L.M. & S., T.D.D. (Wales) in very suitable form. Dr. K. R. Kini replied to the toast. Captain W. E. Mascarenhas and Dr. C. P. Kamath were re-elected as President and Secretary respectively for the ensuing year.

After a vote of thanks proposed by the Secretary, the meeting terminated.

The Krishna District Medical Association, Masulipatam.

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

The minutes of the monthly meeting of the Krishna District Branch of the Indian Medical Association held on Saturday, the 5th October 1940, at 6 P.M.

The meeting was presided over by Dr. M. Seshacharyulu, L.M.S., Vice-President, in the unavoidable absence of G. J. Pacheco, Esq. L.M.S., President. 35 doctors, including 2 female doctors, were present.

During the ensuing Medical meeting, Dr. V. Govindan Nair, L.M.S., L.R.C.P., F.R.C.S., etc., Secretary, Vizagapatam District Branch of the I. M. A., read an interesting paper on 'Small Pox and Its Treatment.' Dr. B. Tirumal Rao, L.M.S., L.R.C.P., F.R.C.S., F.R.F.P.S., D.L.O., Superintendent, King George Hospital, Vizagapatam, read an interesting paper on "The Indications for Tonsillectomy."

Then, with a vote of thanks from the Secretary to the distinguished visitors, the meeting came to a close.

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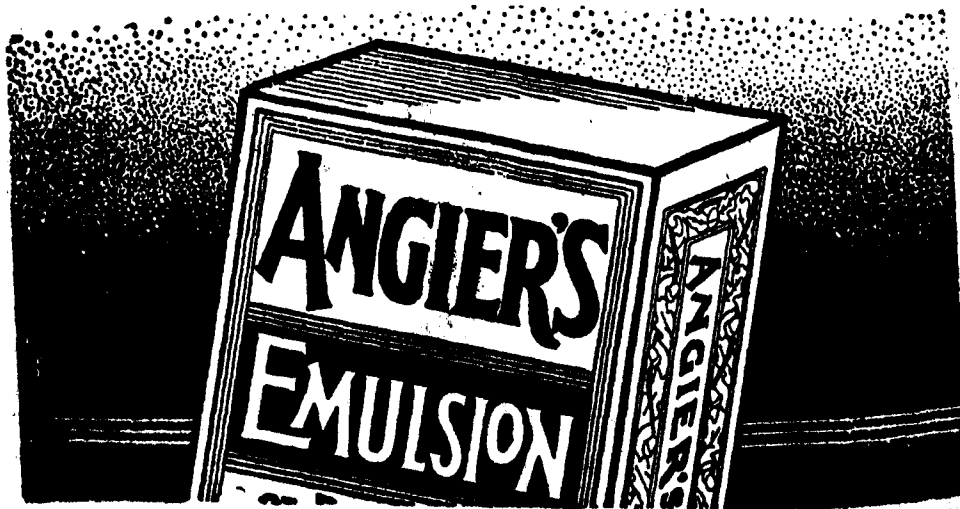
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The Indian Medical Association-Hyderabad, Deccan Branch.

A combined meeting of the Hyderabad Branches of the Indian Medical Association and British Medical Association was held at the Military Central Hospital on the 27th October, 1940 at 4 P.M. Major Waghray, Principal Medical Officer, H.E.H. the Nizam's Regular Forces, Hyderabad, Deccan, and Staff, were at home to the members. A number of interesting cases were demonstrated. The meeting was very well attended.

BOOK REVIEW

We have received Dispensary Label Books Nos. 1, 2, and 3 from 'The Merchants' Press, 85, Nainiappa Naicken Street, P. T., Madras. The labels are printed in various colours and medicines have been arranged in alphabetical order. The types are bold and the workmanship is neat. We commend them to all dispensaries where they are indispensable.

CORRESPONDENCE

The Indian Medical Council.

V. Rama Kamath, Vice-President, Madras Medical Council, writes as follows:—

There appeared a statement in the local dailies recently—the news published by the Associated Special Service—about the affairs of the Medical Council of India and Dr. B. C. Roy's reply to critics, which he made from the chair, while presiding over a recent meeting of that Council in New Delhi. It was said that the Council had decided to establish a General Reciprocity Board for negotiating reciprocal recognition of Medical Degrees granted in British Dominions and other foreign countries and to request the Central Government to amend the Indian Medical Council Act, 1933, so as to provide for an All-India Medical Register in which will be registered all practitioners recognised at present by the Medical Council of India and practitioners holding qualifications granted by Examining Bodies in India other than the Universities and who will be in the Provincial Registers on December 31st, 1947. In the meanwhile, the Medical Council of India intends suggesting to the Central Government to call upon the Provincial Governments to establish uniform standard of University Medical Education in the existing Medical Schools.

In regard to critics who questioned the utility of Indian Medical Council Act, 1933, Dr. Roy was of opinion that their criticisms were mostly destructive rather than constructive, when they said that the Council failed to secure "efficiency at home and honour abroad". At the same time, Dr. Roy admits that, "our honour abroad is rather at discount" as a large number of countries with whom the Medical Council of India had been negotiating for reciprocity did not care to

tions. The number of midwives working during the year was 339 as against 335 in the preceding year.

The expenditure on the Medical Department was Rs. 19,82,217 as against Rs. 19,53,674 in the previous year. The contributions from the local bodies amounted to Rs. 3,40,000 and the receipts from hospital fees of Rs. 1,17,213. A special grant of one lakh of rupees was made during the year for providing up-to-date surgical instruments and other equipments to the major hospitals in Bangalore and Mysore, the district hospitals and certain selected local fund dispensaries, so as to bring the most modern methods of diagnosis and treatment within the reach of the rural population.

The "Mysore Tradition" of philanthropy came to the aid of the Government with a sum of about Rs. 1,49,000 either for the construction of buildings or for equipment.

Under the scheme for the subsidising of medical practitioners in rural areas, nine appointments were made during the year, making a total of sixteen such practitioners, working in the State.

Among the striking features of the year's work may be mentioned the forming of a State Tuberculosis Association for the organisation of a State-wide campaign against tuberculosis and for operating on the State share of the funds of the King Emperor's Anti-Tuberculosis Fund. Eight new buildings were completed and opened for work among which, mention may be made of the Cheluvamba Hospital, Mysore, the Lady Willingdon Tuberculosis Clinic and Dispensary at Bangalore, the Tuberculosis Dispensary at Davangere, and the New Pathological Block of the Krishnarajendra Hospital at Mysore.

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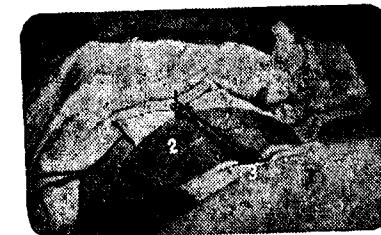
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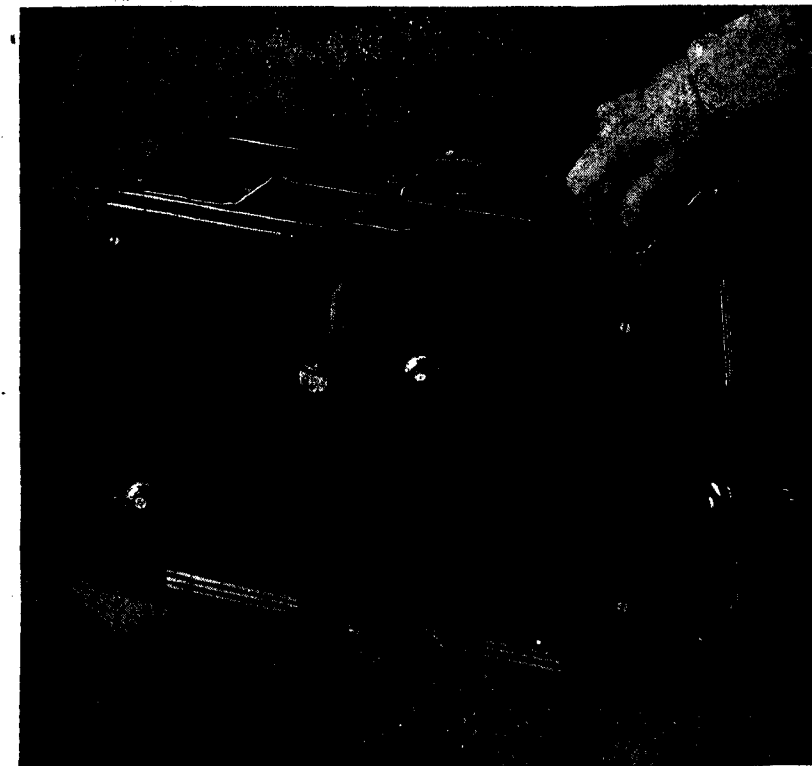
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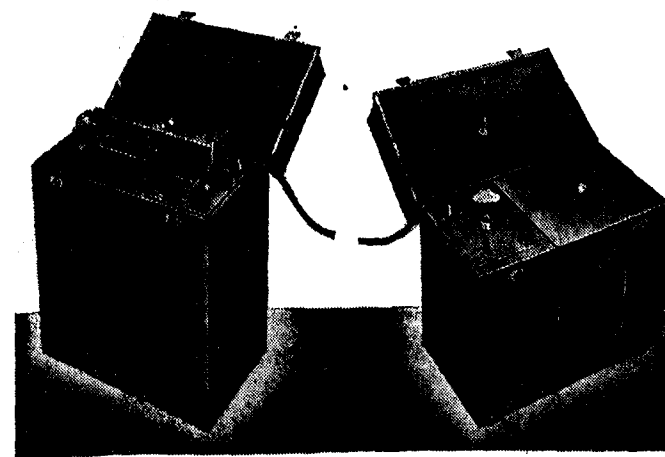
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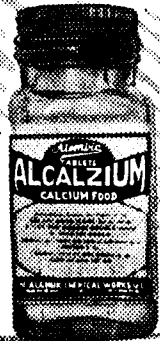
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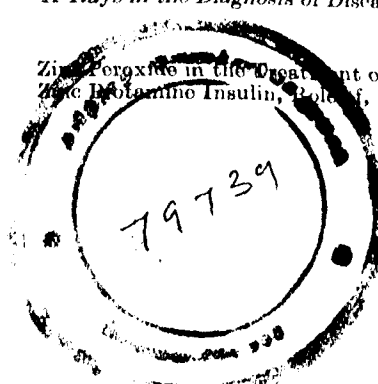
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Cyprus Rotunda—Rubefacient effect; promotes better blood circulation locally.

Balanitis Roxburgi—Bark: has an expectorant action.

Total effect of the smoke will, therefore, be as a stimulant expectorant, with a sedative and antiseptic action on lungs and air-passages.

Internally, as an aid to cure they exhibited calcined pearl and calcined coral. In other words they were giving calcium in the form of oxide (?). We now know that calcium helps to cure the disease by hastening calcification of the affected foci.

कफपित्तक्षयध्वंसी कासश्वासामिमान्वनुत् ।
पुष्टिदं वृष्यमायुष्यं दाहघ्नं मौक्तिकं मतम् ॥
क्षयपित्तकासघ्नं विद्रुमम् ।

(R : T : S : Pur : iv, 16 & 19).

Gold and its salts were also used for their antiseptic, alterative and tonic actions. Several Avalehas, having both medicinal and dietetic value, are largely used in consumption. We shall take two typical examples and analyse them to understand their properties. Aswagandhavaleha :—

Aswagandha (*Withania Somnifera*)—contains an alkaloid, Somniferin, a good sedative.

Pippali (*Piper Longum*)—Volatile oil: pulmonary antiseptic, stimulant and carminative.

Ghee and Honey—Food and vitamin value.

Total effect will be that of a sedative expectorant with marked food and vitamin value.

Agastya-Rasayana, a well known preparation :—

Haritaki (*Terminalia Chebula*)—Laxative, astringent and alterative.

Yava (*Hordeum Distichon*)—Contains diastase besides nutritive factors; hence helps digestive function and improves nutrition.

Dasha-mula (ten roots)—Total action: diaphoretic, laxative, mild diuretic and expectorant.

Chitraka (*Plumbago Zylanica*)—Stomachic and expectorant.

Pippalimula (*Piper Longum* root)—Stomachic, expectorant and pulmonary antiseptic.

Apamarga (*Achyranthus Aspera*)—Contains large quantities of Pot. Carb. and hence helps to liquefy and expel mucus.

Sathi (*Salvia Plebia*)—Demulcent.

Kapikacchu (*Macuna Pruriens*)—Nervine tonic and aphrodisiac.

Samkhapuspi (*Clitoria Ternata*)—Demulcent.

Bharngi (*Cleodendron Serratum*)—Contains a bitter principle having a febrifuge and tonic action.

Gajapippali (*Scindapus Officinalis*)—Aromatic and stimulant.

Bala (*Sida Cordifolia*)—Febrifuge, tonic and demulcent.

Puskaramuli (*Aplotaxia Auriculata*?)—Antispasmodic.

Pippali (*Piper Longum*)—see ante.

Ghee, oil, sugar and honey—Food and vitamin value.

Total effect of the preparation is, therefore, one of a mild laxative, stomachic and stimulant expectorant with a sedative and antiseptic action on respiratory organs, having also high nutritional and vitaminising values. Thus it helps to get rid of toxins (diaphoretic, diuretic and laxative values), acts as a febrifuge, liquefies mucus and helps expectoration, has an antiseptic and sedative action on lungs, promotes digestion and supplies vitamins and nutritive factors.

There are many such formulas of real worth and value.

These measures are augmented by hygienic and dietetic measures as have already been explained. It will thus be seen that the rationale, underlying the treatment of consumption as advocated in Ayurveda, is sound and scientific and is not inferior to the Western methods as far as it goes, *i. e.* if allowance is made for the absence of surgical measures as artificial pneumothorax, electrotherapy, etc. When comparing with modern forms, it should be remembered that the teachings elaborated in Ayurveda are at the least computation, some two thousand years old. The wonderfully accurate and scientific attitude of our forefathers command the highest respect of all thinking men. My studies make me bold to assert that careful research in Ayurveda can give much valuable help for the common weal of humanity, and I strongly recommend Indian Universities to take up the question in right earnest.