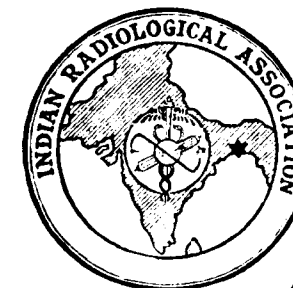


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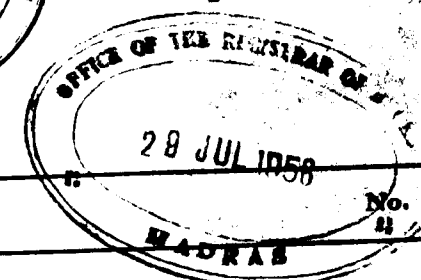
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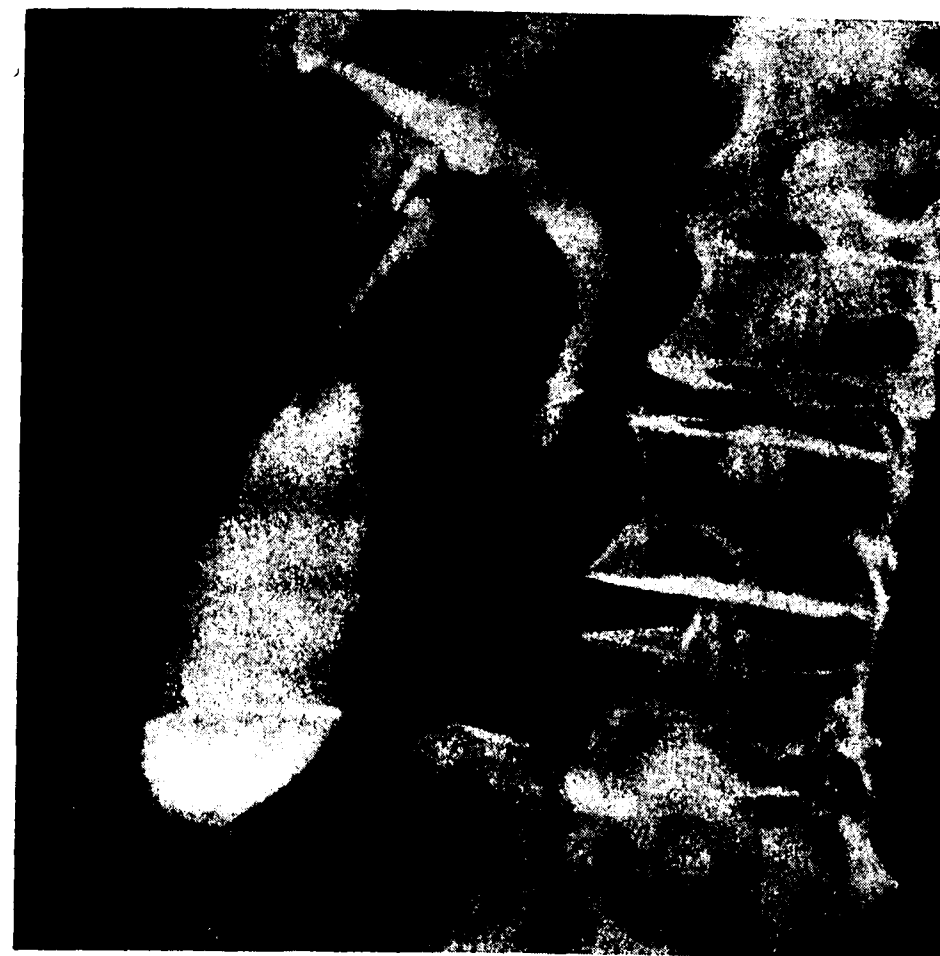


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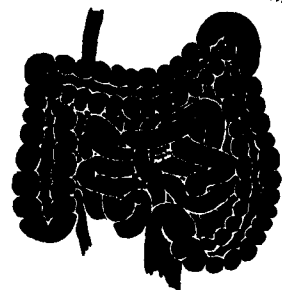
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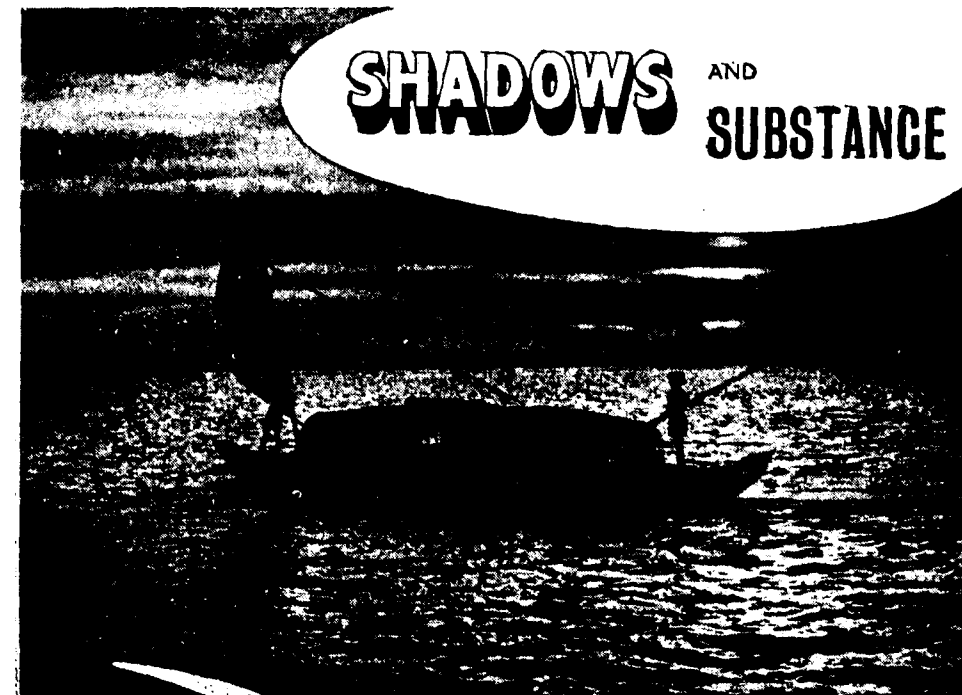
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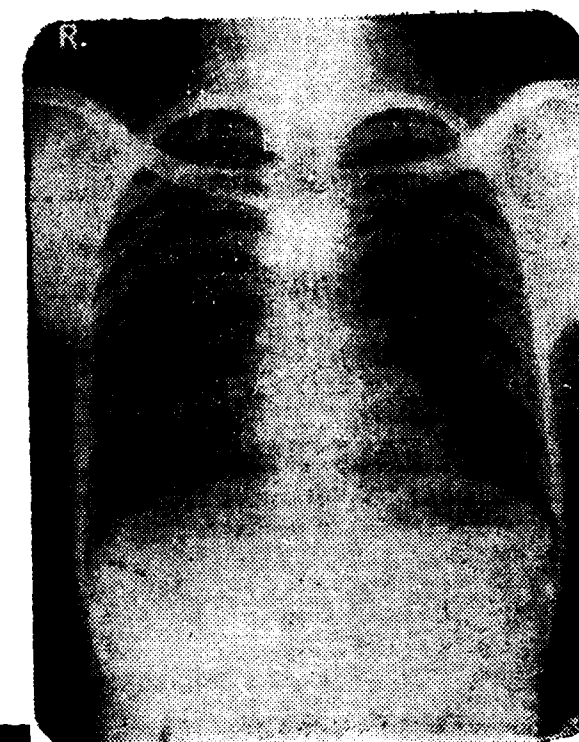
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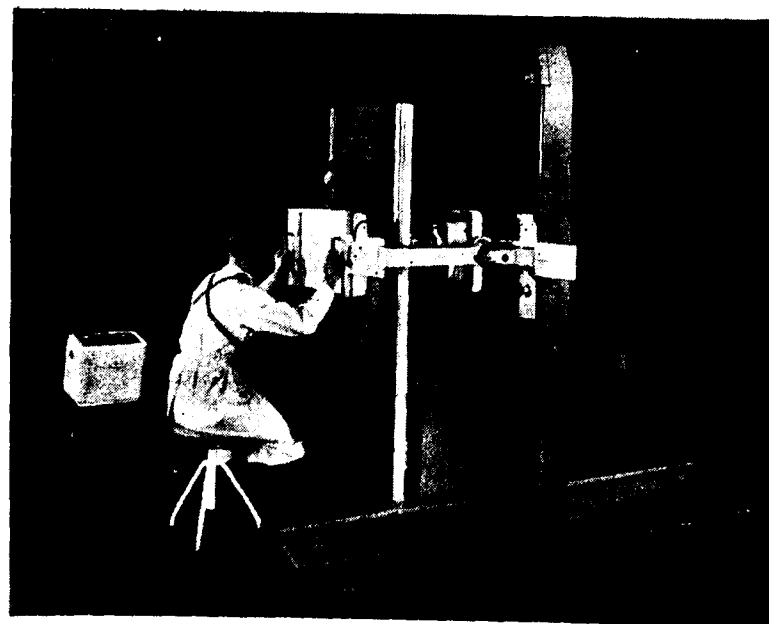
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Editorial

RADIOLOGY AND THE GENERAL PRACTITIONER

BY

Dr. K. P. MODY,

Department of Radiology, Tata Memorial Hospital, Bombay

The general practitioner is the back bone of the community and the most important unit in the medical set up of every country. He is the centre of all medical and health activities. It is to him that the individual looks up when he is ill mentally or physically. Moreover he has a great part to play in preventive medicine and in guiding the destinies of individuals and family units. He is the guide, philosopher and friend. As such he has serious responsibilities to see that he does the best for the patients under his charge. The general practitioner has grown in stature in recent times and the important position he holds is reflected in the several conferences and congresses that are being held.

To cope with this task satisfactorily he has to be fully conversant with all phases of disease and all modern methods of diagnosis and treatment. He has to keep himself well informed and abreast with the times. His task is onerous, he has to have a complete and comprehensive idea of all aspects of medical problems. In fact he has to be a sort of specialist in all branches of medicine.

The importance of Radiology and its impact on modern medicine is very great and is growing day by day. Newer methods of diagnosis and therapy have been introduced so that the radiologist and therapist have themselves to keep abreast of the times by imbibing the voluminous literature that is pouring into the journals but more so by frequent contacts with experts in different parts of the world. It is a highly technical subject, full time job of an arduous nature. Of course, one does not expect the general practitioner or for the matter of that the consultant in different branches of medical science to be conversant with the technical side of the subject. Even for radiologists, it is difficult to keep track of the vast advances that have taken place and are taking place, much more so is it for others not connected with the speciality. Radio-diagnosis and radio-therapy as at present constituted are not just one speciality such is the complexity of modern science. This is being

recognised now-a-days in some countries particularly in the United Kingdom. There is already a tendency to keep distinct the two major groups, radio-diagnosis and radio-therapy. Radio-diagnosis itself is broken up into specialised departments, as for instance, angiocardiology, cerebral angiography and neuro-radiology.

What do we expect from the practitioner? We do not expect him to know the technical side of the work, we do not expect him to do the reading of radiograms. All we ask from him is an awareness of the great help that radiology can give, and knowledge of the different diseases that can be satisfactorily investigated by radiological methods. And that awareness should also apply to the therapeutic uses of X-rays. This knowledge is necessary for him as he will have to decide whether a particular condition lends itself to a satisfactory solution by X-ray examination and whether the condition of the patient demands X-ray treatment, which has great value in alleviating and relieving malignant diseases and certain benign conditions. On the other hand it will rest with him to decide that the condition is not suitable for diagnosis or treatment by radiation. This is a fair arrangement, it is fair to him and it is fair to the patient. In order to make the decision he will have to have a clear idea of the subject and he must have background knowledge. That is why teaching of radiology is made compulsory in the under-graduate courses in the United States. The student starts learning radiology from the first year, in other words he gets radiology minded and at the same time he studies anatomy with the help of radiology.

It is our duty to impart fundamental knowledge to our non-radiological colleagues and to enlighten them as regards the diseases in which X-ray examination is useful. At the outset it must be emphasised that negative findings are as important as positive data. An elderly person comes with the complaint of vague discomfort and dyspepsia after food. We give him a barium meal and rule out cancer. This is a service of a very high order, we have ruled out disease which proves fatal in 95% of cases. But here it must be emphasised that the examination has to be very thorough, it is an examination requiring experience and technic of a very high order. We have to visualise and study peristalsis, motility, mucosal pattern, size and contour of the stomach after administration of successive quantities of barium and ending with studies after air insufflation. If the patient has not got cancer, has he got an ulcer or gastritis? Ulcers of the stomach can be satisfactorily demonstrated, but it is very difficult to decide whether they are benign or malignant. In gastritis, X-rays may help particularly in ruling out serious conditions but here more definite information can be obtained by gastroscopy. The diagnosis of gastric cancer, a very common condition in Europe,

not so common in ours, to have any real value should be in the detection of the early case, in the later stages diagnosis is easy but has merely academic value as the case is gone beyond the stage of curative surgery. Unfortunately the symptoms of early carcinoma are hardly any so that the problem comes up whether we should routinely X-ray every adult person over the age of 50. This is attempted in the United States but it would be practically impossible in our country and even in an advanced country like the U. K. The general practitioner, however, can play a very important part in this connection knowing the background of his cases. An elderly man who has enjoyed good health all along and starts complaining of unaccountable loss of weight and dyspepsia should have radiological investigation to rule out organic disease, particularly malignancy. Other tests such as gastric analysis should also be carried out. He may have lack of acid, which later on tends to develop into malignancy or he may have excess of acid, which later on could lead to a peptic ulcer. Such cases should have X-ray examinations from time to time. Cancer of the large bowel and rectum can be detected by barium enema examination. This is done by giving an enema of barium sulphate under screen examination followed by pumping in air, what is known as double contrast enema. Such cancers can be diagnosed by X-rays alone. Amongst the benign conditions amebic infections and the after effects of dysentery, colitis, lend themselves to characteristic X-ray appearances. Very often patients are sent for X-ray of the appendix. This is a very unsatisfying job as frequent examinations are necessary in order to visualise the appendix, in an appreciable percentage of cases it does not fill and the results of such examinations are sometimes not satisfactory. But there is one thing the examination will reveal and that is the condition of the coecum, it will rule out tubercle and amebic affections of the coecum. Though cancer of the stomach does not seem to be common in our country as compared to the West, Cancer of the Esophagus is extremely common. The diagnosis of this condition can be satisfactorily done by X-rays. A small amount of creamy barium mixture is kept in the mouth and the patient is asked to swallow it under screen examination. There may be signs of obstruction, partial or complete often associated with irregularity of the barium column. Unfortunately, the condition is usually not recognised till the patient has developed symptoms of dysphagia. The patient does not come nor is the clinician's attention directed to it for the simple reason that there are no symptoms in the early cases. Oesophagoscopy must always be done in suspicious cases, and a biopsy taken, a very valuable procedure and gives earlier indication than X-ray examination. The treatment for an early case is operative but the large majority of cases turn out to be advanced and X-ray treatment is the only one left for us to do. The results are extremely poor, in a large series of cases at our hospital only 14

out of 1200 treated cases survived for 5 and 10 years. Results in foreign clinics are equally discouraging. Though cure of the condition is rare, relief from the distressing symptoms is obtained in quite a good few cases. The passage is restored and the patient can swallow for a number of months or even years. This discouraging and tragic problem has given us a great impetus for the development of newer methods. Supervoltage therapy units are now routinely used working at 2 to 3 million volts and more, instead of the conventional 250 to 400 K. V. The greater the voltage, the greater is the penetration of the rays, which is of distinct advantage in deep seated conditions. Another method recently developed is Rotation Therapy, the patient sits on a chair which revolves automatically and the rays are directed to the esophagus under direct screen vision. Another revolutionary design is the Pendulum Therapy where the patient is stationery and the X-ray tube revolves. The idea of rotation or pendulum is to direct the rays on the esophagus from different directions, so that a heavy dose is built up. In spite of all these advances very often the patient has to have a gastrostomy so that he can be fed by a tube in the stomach.

Gall Bladder diseases are very commonly met with particularly stones and cholecystitis. X-ray examination is essential, both routine examination and cholecystography. With the newer dyes the examination is very reliable. Calcified stones are seen best in the routine view, on the other hand translucent stones require cholecystography studies. Recently intra-venous injections of dyes are used without any ill effects. Both methods have their uses, the oral method may be used first followed by the intra-venous technic if results are not conclusive.

Urinary tract investigation also gives valuable information. In the remote period, soon after the discovery of X-rays, exposure time for a kidney radiogram was nearly 30 to even 60 minutes, to-day it takes a fraction of a second. Intra-venous pyelography was introduced in 1925, it gives complete data regarding the functional activity of the kidneys the size of the kidneys and ureters, any obstruction by stone or stricture, neoplasms of the kidney and bladder. The technic must be perfect. Very often the intra-venous method is supplemented by retrograde pyelography particularly in the case of tumours, benign and malignant. Retrograde pyelography is a surgical procedure whereas the intra-venous method is simple and routine. The injection is not attended with any risk, except in rare cases. To guard against such an eventuality, the injection has to be given very slowly.

The commonest examination is for injuries to bone. A clinician can usually diagnose a straightforward fracture without X-ray examination.

Even so radiology is essential. The examination shows the type of fracture, the extent of displacement of the fragments, the condition of the bones whether normal or decalcified, and also indicates whether the fracture is pathological. In children all injuries must be X-rayed, as the epiphysis are often damaged and displaced, Clinical diagnosis may not reveal such deformities. Moreover green stick fractures may occur for which X-ray examination is essential. Industrial workers should always be radiographed for injuries sustained, as the question of compensation comes in. Legal action may be taken against the practitioner if X-ray examination is not done, there have been several such cases reported from England and America. Head injuries require great care in the manipulations during X-ray examination, it is advisable to X-ray these cases at the bed-side.

X-ray examination of the chest is of inestimable benefit. To-day there is a great upsurge of Thoracic Surgery and that has been made possible owing to the great help from radiological investigations. Tuberculosis and Carcinoma of the Lungs are common diseases. X-ray examination alone enable us to diagnose these diseases in their early stages. The radiograms give us a wealth of information, early minimal lesions show up, the type of lesion is demonstrated and the extent and nature of the underlying pathological process. Whether a particular line of treatment does good or no, X-rays alone can decide.

The detection of early T. B. is of paramount importance, many of these cases are asymptomatic, many others masquerade as other infections. Its importance is so great that mass Radiography is considered a potent weapon for our fight against T. B. It is a specialised form of X-ray examination in which instead of using big size films which are costly, small 35 mm. or 4×5 films are used with considerable decrease of cost. In the world war all the recruits had their chests X-rayed, in many other services chest X-rays is made imperative.

How can we utilise mass Radiography to the best possible advantage? In countries like the U. K. and the Scandinavian countries every one of the population is subjected to a yearly survey. It would not be a practical proposition for a vast country like ours, but there is still scope for the method in selected directions. We can X-ray school children and collegians, we can X-ray the industrial population, we can X-ray the contacts.

We must impress upon the practitioners that X-ray examination of the chest should be done without wasting time. It is a simple procedure and can be made quite inexpensive and rules out T. B. How often we get cases in an advanced stage instead of clearing up the diagnosis by a routine X-ray

examination! Moreover it is their paramount duty to X-ray the contacts in active cases. We hear criticisms which are difficult to understand. Some authorities say what is the use of diagnosing tubercle when we have not adequate facilities for admission in hospitals, for sanatoria accommodation etc. This is a defeatist attitude which should not be encouraged. The incidence of Tubercle have dropped in the West considerably, for instance, in the U. S. A. it now occupies the 9th position in mortality statistics, it used to be 3rd on the list. This is due to vast organisations against T. B. in which Radiology plays a prominent role. The appearances in an X-ray picture are almost pathognomic though there are cases when diagnosis is difficult.

Radiology is used in the detection of other chest conditions, such as Pneumonias, Eosinophilic lung, Lung cysts, Benign and Malignant tumours. In the Pneumonias, with the help of radiology we have come to classify a special group of what are known as "Virus Pneumonias".

It is the universal experience that Cancer of the Lung has increased and is increasing every day. We shall not discuss why it is so. It is a dreadful disease, and even with the best of treatment, results are negligible 3 to 5%. Why should it be so, with the great advances that surgery has made? The reason is that the case usually comes late being entirely symptomless in the early stages. In the U. S. A., Research Chest Institutions have programmes for the routine examination of chests in a large group of cases and it has been recorded that nearly 20% of cases without symptoms present early Cancer of the Lung. Radiology is the only one single method which can visualise and diagnose Cancer of the Lung. Here it must be emphasised that whenever there is a shadow in the lung, particularly in the elderly patient, the shadow must be taken as Cancer unless proved otherwise by subsidiary tests such as Bronchoscopy, Bronchography, Cytological examination of the sputum. Cytological examination has come into vogue comparatively recently. Cancer cells can be detected in the sputum in a large percentage of cases.

A few words on Radiation-Therapy are essential, the general practitioner should have some idea of the subject. Skin diseases, arthritic conditions, some gynaecological abnormalities and tuberculous glands form a large non-malignant group amenable to X-ray treatment. Then there is the large group of malignant neoplasms which are benefitted by radiation treatment, which includes Radium, X-rays and Radio-active Isotopes. Chemo-therapy is also being developed and used for the treatment of neoplasms affecting the reticulo-endothelial system, chiefly the Leukaemias, the Lympho-Sarcomas and other forms of malignant Lymphomas. In

non-malignant conditions, doses are very small, given at intervals of 4 days to a week and the exposures are few. Immediate results in selected cases are gratifying. The symptoms may be relieved but we must realise that the underlying pathological condition may persist and there may be a recurrence. In skin diseases, for instance, the itching may be minimised, the patch may disappear, and yet there is nothing to prevent recrudescence and recurrence, probably in other locations. Our best results are in T. B. glands and in Gynaecological conditions, such as in the control of uterine bleeding. Artificial menopause can be readily induced. Before undertaking treatment, it is essential that there is a thorough check up to rule out malignant conditions.

Radiation treatment finds its greatest application in malignant neoplasms. Treatment to be successful must be thorough, usually daily doses are given and the course may last from 3 to 6 weeks or more. Reactions on the skin and mucosal surface are fairly severe, causing great discomfort to the patient, associated with pain and feeding difficulties. During this period the general practitioner has an important part to play, it will essentially devolve on him to tide the patient over this critical period. Reactions are bound to take place, the visible effects on the skin must not be labelled as "burns". Reactions are legitimate effects, burns are criminal and are due to rank ignorance on the part of the radiologist. Reactions heal in from 3 to 6 weeks and the parts affected return to their normal status, whereas burns very often may not heal at all.

In conclusion may we state that the object of this presentation is to emphasise the important role of the general practitioner in radiological practice. An attempt is made to give some simple data on the subject.

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Editor-in-Chief.

Use of Barium Tannic Acid Enema in the Investigation of Large Intestine

BY

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AND

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The use of powdered Tannic Acid with Barium sulphate suspension in the investigation of large intestinal disorders has been advocated by many workers. Hamilton (1946)¹ and later on Christie, Schwarz, Coe, Hampton and Wyatt² have used it as a routine measure and noted its advantage in the demonstration of mucosal relief pattern and early diagnosis of small polyps and carcinoma. Moreton³ in evaluating different preparations of Barium suspension says that pure Barium sulphate causes unsatisfactory pictures as (1) The barium dries on the colonic wall thus cracking of the outline occurs. (2) It does not adhere uniformly to the colonic wall. Addition of Tannic Acid to pure Barium sulphate suspension on the other hand has the following advantages as described by Christie et al:—(1) Contraction and complete evacuation of colon (2) Astringent action of Tannic Acid causes inhibition of mucus secretion and hence uniform mucosal coating. (3) Tannic Acid causes Barium sulphate to adhere to the bowel wall.

In the Radiology department of Christian Medical College Hospital, Vellore we have used Tannic Acid as a routine measure for the last two years and in this paper we shall attempt to present the results so far obtained.

Material

The material consists of 614 patients who were sent to us for barium enema examination for various colonic disorders (Table 1). They were derived from all sections of the community and were of varied social and economic status. They include patients of both sexes and all age groups. No selection of cases was made.

Method

Preparation of the patient:—For an adequate Barium enema investigation it is essential to have the large bowel thoroughly cleared of faeces. For this purpose we have found that Castor oil 2 ozs. given at 4 p.m. the day before (after a light meal) is the minimum evacuant needed to clear the bowel in the average Indian patient. Golden advocates the use of Castor oil except in cases of suspected acute appendicitis or colonic obstruction. Schinz⁴ recommends two table-spoonfuls of Castor oil after a cleansing enema in the afternoon before the examination. He states that the optimum contractile effect of Castor oil is achieved six hours after its administration and that contractions subside soon after this period is ended, so that on the following day the oil no longer has any observable influence on the intestinal function. He further goes

on to say that his attempts to substitute for the bad tasting Oleum ricini any other kind of purgative preparation has failed. In our experience any quantity of Castor oil less than 2 ozs. has failed to clear the bowels (especially the caecum) of faecal matter. In addition to the use of Castor oil, we use plain water enema in the morning at least 2 hours before the examination. Soap water is not used as this has irritant effect and is likely to leave the colon filled with non-opaque fluid which dilutes the barium suspension when the examination is done (Golden)³. We have tried to impress on the nursing staff the proper way of giving a cleansing enema; unless enemas are repeated until the returning fluid is absolutely clean, the preparation is likely to be incomplete. If the patient is ambulant, walking about helps him evacuate any residual gas and fluid.

Apparatus used

1. Ordinary 1 quart douche can for holding the opaque medium.
2. A length of rubber tubing with glass connection.
3. Sterile rectal enema tubes to be attached to the glass connection.
4. Clamps.
5. Telescopic stand for suspending the douche can.
6. Higginsen's syringe for air insufflation.

Making up of opaque medium

4 ozs. of pure Barium sulphate are suspended in 1000 c.c. of plain warm water, and to this 5 gms. of previously weighed Tannic Acid powder is added. Previous workers have used 1 gm./100 c.c. of suspension but we have found 0.5 gm. quite effective. With this amount very few undesirable side-effects have been noted.

X-ray examination

The roentgenological examination is carried out in 3 stages.

Stage I

Filling of the colon with opaque medium: - The patient is examined first lying on his back. The examination commences with screening of the patient's chest and abdomen. Particular attention is paid at this stage to the presence of gas and faecal matter in the intestine. If large faecal masses are seen, the patient is sent back for further preparation. If the bowels appear clear of faeces, the lubricated enema tube is introduced into the rectum, and Barium Tannic Acid suspension is allowed to flow slowly into the rectum under a pressure of two feet of water. Care is taken to avoid running in too much at first as this has been seen to cause sudden contraction of the rectum and evacuation on the table. Lateral or oblique views of the rectosigmoid area may be taken. Spot films are taken if necessary as barium flows in, to demonstrate the presence of a localized lesion. After filling the colon, barium passes into terminal ileum in those cases where the ileo-caecal valve is incompetent. Shanks⁶ says it is incompetent in at least 50% of cases. We have also noticed free passage of barium into the ileum in more than half of our cases. Too much barium must not be allowed to flow into the ileum or ileal shadows may obscure the sigmoid.

A large film to cover the abdomen from the level of diaphragms to symphysis pubis is taken at this stage. The patient is then sent to evacuate his bowels.

Stage II

We have found in our series of cases that one evacuation is usually enough to clear the bowel of barium and give a good mucosal relief pattern of the entire colon after

evacuation. The patient is again screened in the supine position and another large film is taken. Care is taken to observe on the screen that the patient can understand the instructions to stop breathing during the exposure!



Fig. 1

Barium Tannic Acid Enema: - Good details of mucosal pattern seen throughout the colon on an after evacuation film. Normal colon.

Stage III

Air Contrast: - The value of air contrast in studying the colon was first demonstrated by Fischer who introduced air into the Barium filled colon. Subsequently Moreton, Cooper and Foegelle⁷ described a modified method for this procedure. They injected air with the patient in the Trendelenburgh position by means of a two-way attachment, to the enema tube. Polgar⁸ examined his patients in the lateral recumbent position

and introduced air into the descending and transverse colons; he took telerradiograms in this position. He mentions the advantages of air contrast in demonstrating early polyps and carcinomas. Shanks describes air contrast in his 3 stage method; he introduces air after evacuation and repeats it until a thin layer of barium remains, coating the mucosa of gas distended colon. This method is rather time-consuming. We have been able to obtain good air

contrast by injecting air after only one evacuation. After injection of the air the patient is screened and a third large film is taken. Special attention is paid at this stage to the full distension of the caecum, under screen control.

Exposure factors: used for the 3 large films are, for average patients 80 KvP, 300 Ma, 0.2 seconds. The Kv may be high and the time must be as short as possible. Distance is 30", moving grid. The undercouch Rotating Anode tube is used to save time.



Fig. 2

Barium Tannic Acid Enema:—After evacuation and air insufflation. Good adherence of barium to the wall of the colon with double contrast effect—Normal colon.

Results

1. *Improved assessment of the condition of the colonic mucosa.*—By the older method of plain Barium enema the after-evacuation film showed good contraction of the bowel in only 37% of cases (Table I) and we were only able to see details of mucosal pattern in about 20% of these cases. Air insufflation

only succeeded in showing good double contrast in about 10% cases. By the Tannic Acid method, (Table II) shows that out of 614 cases examined 497 (80.9%) showed good contraction after one evacuation and it was further found that almost all these cases showed good details of mucosal pattern throughout (Fig. 1). Thus good visualization of mucosal pattern has been increased from

about 20% about to 75% cases. Similarly careful preparation we feel that these good double contrast effect after air insufflation figures could be still figures could be still has been improved (Fig. 2). With more further improved.

TABLE—I
Contractile effect after Evacuation of plain Barium Enema

Diagnosis	Total No. of Cases	Good Contraction
Tuberculosis ...	27	10 (37%)
Colitis ...	25	9 (36%)

TABLE—II
Incidence of diseases and of the contractile effect of Tannic Acid Enema

Diagnosis	Total No. of Cases	Good Contraction
Normal ...	390	329 (85%)
Tuberculosis ...	54	47 (87%)
Colitis ...	65	39 (60%)
Carcinoma ...	38	32 (84%)
Diverticulitis ...	5	4 (80%)
Polyp ...	3	3 (100%)
Amoebiasis ...	14	13 (92.4%)
Miscellaneous ...	30	30 (100%)
Hirschsprung's Mega Colon ...	15	—
Total ...	614	497 (80.9%)

Poor visualization of mucosal pattern due to non-adherence of Barium especially in the descending colon is considered to be an extra pointer to the diagnoses of colitis (Fig. 3).

Where good mucosal details are seen, it is also possible to see filling defects in the

mucosal pattern that may be caused by even small polyps. Small diverticulae may sometimes be seen filled by this method. Absence of normal mucosal pattern in the splenic flexure was noted in one case that proved to be one of tuberculous peritonitis (Fig. 4).



Fig. 3

Ulcerative Colitis:—Woman, aged 49. Blood and mucous in stools for 2 years. Sigmoidoscopy showed very ragged angry-looking mucosa. Barium Tannic Acid enema:

Film 1 shows absence of normal haustration and areas of spasm in the transverse and descending colon. *Film 2* after evacuation shows absence of normal crenated mucosal folds and incomplete contraction. *Film 3* after air insufflation shows rather poor adherence of barium to the colonic wall and absence of normal haustrations.



Fig. 4

Tuberculous Peritonitis:—Film after evacuation shows irregular mucosal pattern in the splenic flexure and poor contraction with absence of mucosal folds and of haustration in the descending colon. Operation and biopsy revealed T. B. peritonitis involving the fibro-fatty tissue, but no evidence of T. B. in the bowel wall.

2. *Improved assessment of the condition of colonic musculature*.—With the plain enema it has been our experience that only 37% cases show good contraction of the bowel after evacuation, (Table I). With Tannic Acid enema, (Table II) shows that in normal cases 85% show good contraction whereas in cases of colitis only 60% showed good contraction. Similarly after air insufflation some cases of colitis showed areas where there was failure of expansion of the lumen under air pressure. Poor contraction after evacuation was noted in 40% cases of colitis. In one case of Amoebiasis there was a very

peculiar constant irregularity of the transverse colon.

One of the pitfalls of diagnosis in the barium enema is the case where there is a constant spasm stimulating obstruction. It is often worthwhile carrying out a repeat enema using plain barium in a case where a Tannic Acid enema cannot be passed beyond a certain point (Fig. 5) illustrates a case where the first enema failed to pass beyond the transverse colon, but where the second enema revealed an intussusception caused by an eosinophilic Fibroma.



Fig. 5

Constant spasm stimulating obstruction.

- A. Enema failed to pass beyond the transverse colon. Partial filling of the hepatic flexure.
- B. Repeat enema showed intussusception in the ascending colon.

Operation and Biopsy revealed an *Eosinophilic* fibroma of the ileum causing an *intussusception* as far as the transverse colon.



Fig. 6

Diverticulitis and diverticulosis of the colon showing poor contraction after evacuation of Tannic Acid enema, probably due to the presence of inflammation in the bowel wall.

3. *Improved visualization of the Caecum.*—One of the commonest requests is for the Radiologist to exclude T.B. or other diseases of the caecum. In spite of our best efforts, the caecum may still contain faeces, or there may be spasm in the ascending colon beyond which barium will not at first pass.

By the Tannic Acid method the caecum is usually made to contract at evacuation and any faeces that were still in it, are forced out. By air insufflation the caecum can then be distended under screen control and a film will usually show good details of the caecal outline and mucosa.

4. *Incidence of diseases of the colon in South India.*—Analysis of these 614 cases (Table II) shows that there was radiographic and clinical evidence of colitis in 65 cases, Tuberculosis in 54 cases and carcinoma in 38 cases. 14 cases clinically diagnosed as Amoebiasis showed little definite evidence of radiographic signs. Diverticulosis was rare (5 cases) and diverticulitis very rare

(Fig. 6). Hirschprung's disease and mega colon were not uncommon (15 cases). These last cases require special examination with a small amount of barium in the rectum and sigmoid only in order to demonstrate the narrow aganglionic segment.

Colitis of one form or another is the commonest condition encountered in our Barium enema series. The additional signs of failure of barium to adhere the gut wall after evacuation in cases of colitis, and the sign of failure of expansion of the gut after air insufflation are we believe of value in the diagnosis of this disease.

Summary

1. 614 patients of varied type were examined by Barium enema containing 0.5% Tannic Acid.

2. Careful preparation using 2 ozs. Castor oil and repeated water Enema is essential.

3. Three large films are taken in most cases:—

- (1) Bowel filled with barium (2) After evacuation to show mucosal pattern (3) After air insufflation to show expansibility of gut, particularly the caecum.

(b) Improved assessment of the condition of colonic musculature, spasm, organic defect etc.

(c) Improved visualization of the caecum.

4. By this method one can obtain:—

- (a) Improved visualization of intestinal mucosa.

5. The incidence of diseases of the colon in South India is indicated.

6. An Additional sign in the diagnosis of colitis is described.

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Testing New Barium Sulphate Preparations

BY

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The value of non-flocculating barium suspension in investigating the G. I. T. in South India has recently been demonstrated (Paterson 1957) A number of new non-flocculating preparations are now available. I have recently used a modification of the method described by Astley and French for testing these barium suspensions.

I. Test for suspension

Three types of barium sulphate preparation were placed in test tubes and left standing for 3 days. The results were as follows (Fig. 1).

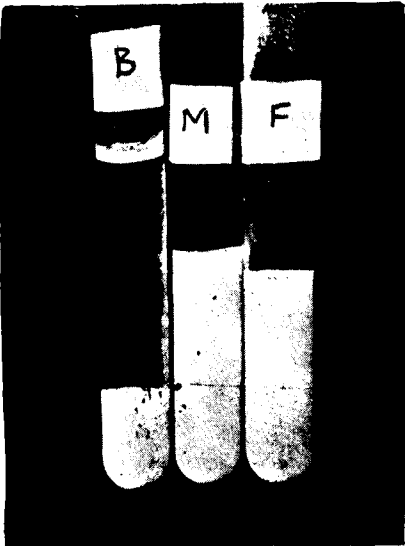


Fig. 1
Test for suspension.

Preparation B.—Ordinary barium sulphate 2 grams in tap water 10 c.c. all precipitated to the bottom of the test tube in a few hours.

Preparation M.—“Micropaque” 2 grams in tap water 8 c.c. —no visible Precipitate even after 3 days.

Preparation F.—“Fotogel” 2 in 1 in tap water 8 c.c.—a clear layer in the top ¼” of the barium colum was seen after 1 day and ¼” after 3 days.

II. Test for flocculation

The above three types of medium were mixed with human saliva and with human jejunal juice in petric dishes, and the results compared with a control suspension in water only. The results show that ordinary barium sulphate suspension flocculates markedly in saliva, less markedly in intestinal juice, and not at all in water, whereas the two “Non flocculating media” do not flocculate either in saliva or in intestinal juice.

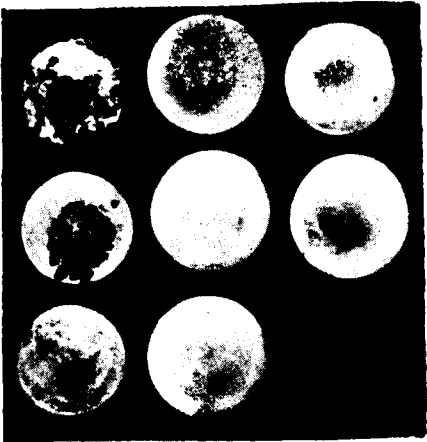


Fig. 2
Test for flocculation.

The results are illustrated in the following table and photograph

B		M		F	
Saliva	2 c.c.	Saliva	2 c.c.	Saliva	2 c.c.
Water	10 c.c.	Water	10 c.c.	Water	10 c.c.
Ba SO ₄	1 c.c.	Micropaque	1 c.c.	Fotogel	1 c.c.
100%		100%			
Jejunal juice	2 c.c.	Jejunal juice	2 c.c.	Jejunal juice	2 c.c.
Water	10 c.c.	Water	10 c.c.	Water	10 c.c.
Ba SO ₄	1 c.c.	Micropaque	1 c.c.	Fotogel	1 c.c.
100%		100%			
Water	2 c.c.	Water	2 c.c.	...	
Water	10 c.c.	Water	10 c.c.		
Ba SO ₄	1 c.c.	Micropaque	1 c.c.		
100%		100%			

Flocculation Pattern

B		M		F	
Marked Clumping		Nil		Nil	
Granular		Nil		Nil	
Nil		Nil		...	

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Different Stages of Radiological Epiphyseal Union

BY

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While determining the ages of epiphyseal union in the long bones of inferior extremity in U.P. subjects, it was seen that an epiphysis before it is completely united with the diaphysis undergoes series of changes in itself and in the diaphysio-epiphyseal space, which separates it from the diaphysis. These changes can be divided into various stages. Three hundred twenty five cases have been skiagraphed of which 300 are boys and 25 girls. In this work various stages of epiphyseal union have been studied in age groups from 15 to 20 years. The bones of left side only have been skiagraphed due to the fact, that as there is less stress and strain on this side the changes are more uniform.

Scheme of Work

The 325 subjects studied were collected from the local schools and colleges and from private homes of educated people. These cases have been taken from all sections of population *i.e.* Hindus, Sikhs, Mohammadans, Christians and Anglo-Indians. The only criterion of selection has been the correct age. Wherever the parents were not sure of the correct ages of their children, these cases have been straightway discarded.

Age Groups

50 boys have been taken up in each age group and in all the following 6 groups have been studied:

- The 15th year group
- The 16th year group
- The 17th year group

- The 18th year group
- The 19th year group
- The 20th year group

The bones investigated:

These are:

- The lower end of femur
- Upper end of tibia
- Lower end of tibia
- Upper end of fibula
- Lower end of fibula

Skiagraphy

The skiagrams were taken by the plant available in the Department of Anatomy K. G. Medical College, Lucknow the plant being G. E. Model 30 m. amp.

- Part and side X-rayed.

The parts X-rayed were the left knee and left ankle region.

- Numbering of X-ray plates.

Each plate was given the same number as the serial number of the cases. Lead numerals were used which could be read on the plate when it was washed. The size of plate used was 12" × 15".

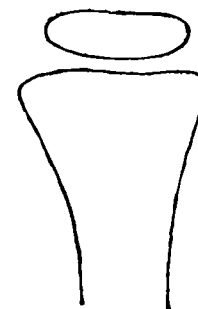
Position of joints during X-rays:

- The knee region was skiagraphed for the anterior-posterior view with joint fully extended. For the lateral view the knee was slightly flexed.

- The ankle region was X-rayed with foot at right angles for the anterior-posterior view and plantar flexed for the lateral view. In the lateral view the over shadowing of the fibula could not be helped.

Observations

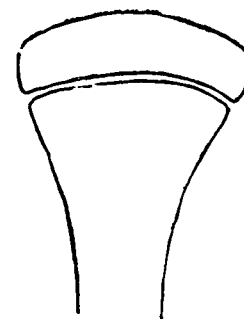
Union of epiphysis with diaphysis marks an important landmark in the process of ossification. It has been observed that the changes which take place in the epiphysis and diaphysio-epiphyseal space can be subdivided into six stages. The six stages are:



Stage I

Abbreviation used (-N)

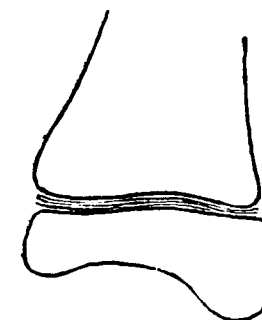
In this stage there is no union or surface adaptation between the epiphysis and diaphysis. Here the epiphysis does not cap the diaphyseal end.



Stage II

Abbreviation used (—)

In this stage there are no changes in the diaphysio-epiphyseal space. There is no



Stage III

Abbreviation used (B)

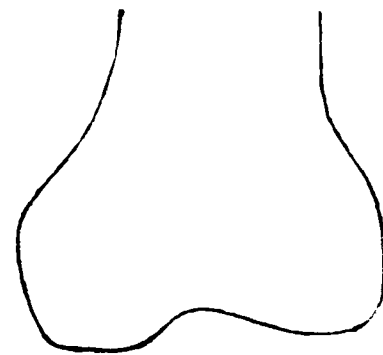
This stage denotes beginning union. Here the obliteration of diaphysio-epiphyseal space has started. The space is traversed by wavy lines the appearance of which gives an indication of the beginning union.



Stage IV

Abbreviation used (R)

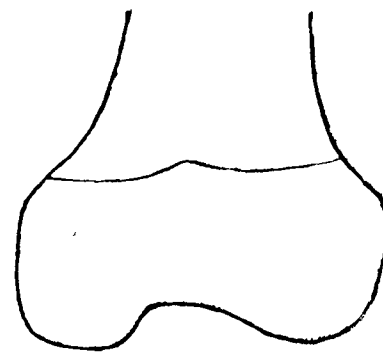
In this stage is represented "Recent Union". Here the diaphysio-epiphyseal space is obliterated but at the periphery of the space some notching still persists both in the antero-posterior and lateral view.



Stage V

Abbreviation used (+)

Here there is complete union between the epiphysis and diaphysis. The diaphysio-epiphyseal space is completely united. There is no notching or epiphyseal scar and there is uninterrupted continuity of periostum between the epiphysis and diaphysis.



Stage VI

Abbreviation used (+S)

In this stage there is complete union between the epiphysis and diaphysis, but at the site of diaphysio-epiphyseal space a white line persists. This is called the epiphyseal scar. The time of disappearance of epiphyseal scar is not uniform and so its absence or presence is disregarded. The epiphyseal union is assumed to be complete even if the epiphyseal scar is present.

Discussion

Sidhom et al (31) have divided the process of epiphyseal union into three stages :

1. In first stage interval between the epiphysis and diaphysis is occupied by cartilage skiagram shows a very definite gap between the two. A section of bone taken through the growing end of the bone shows that cartilage is continuous with or attached to a very thin smooth plate of bone on both the epiphyseal and diaphyseal side. The process of osteogenesis and osteoclasia takes place in association with these thin plates of bone. They are said to be more marked in relation to diaphyseal plate than to epiphyseal one. Section shows that the cartilage cells arranged in their usual orderly rows increase in size towards the diaphyseal plate, which on epiphyseal side are fewer in number and more irregular. It would seem from above that the process of osteogenesis is more marked on diaphyseal side while at the epiphyseal side osteoclasia takes place with the formation of cancellous bone. In this way bone lengthens while the bony plate remains of the same thickness. Near the time of union cartilagenous space becomes less wide and the two bony plates eventually fuse with the cessation of growth. This ends first stage.

2. In the second stage single plate of bone formed by the fusion of the epiphyseal and diaphyseal plate is often seen in the skiagram.

3. Third stage is reached when this bone plate is entirely absorbed and replaced by spongy bone. The third stage is in their opinion hardly to be regarded as anything but a sequel to process of union. It is nothing or less than what has been described as epiphyseal scar. Were such bones to be macerated, epiphysis and diaphysis would remain attached.

Flecker (33) believes that the classifications are superfluous and unnecessarily complicate the observation. He has merely noted 'non fusion' and 'fusion', the latter referring to entire disappearance of the epiphyseal plate which in the most cases is not difficult to determine. A liner shadow which may sometime persist even for years at the junction of epiphysis and diaphysis is interpreted as fusion.

Galstaun has described the various stages as follows :

O for no union.

C + for commencing union. In these cases the epiphyseal space is present but is beginning to cloud over. In many cases fine stria of bone are seen connecting the epiphysis and diaphysis.

JC + an earlier stage in the same process.

N + where this process is nearly complete but the epiphyseal line (apart from the scar) can still be distinguished.

J + union just complete.

Todd, A. W. N. Todd, T. W. 138, while working on epiphyses of ungulates mention that pattern of epiphyseal union is not related to growth size and sex. They have recorded this observation using the following abbreviations :

(-) base line indicating absence of union.

(b) is beginning union—1st step.

(r) recent union—2nd step.

(+) Complete union—3rd step.

Theodore T. Zuck (38) while working on age order of epiphyseal union in guinea pigs has recorded his observations like Todd, T. W. and Todd, A. W.

In author's description of the stages of radiological epiphyseal union it will be seen that stages of epiphyseal union into which the various readings of skiagrams have been charted are based on simple letter of the alphabet and + and — signs. The whole process of radiological epiphyseal union has been divided into 6 stages. The stage described are descriptive of the process in a clear manner and are neither too meagre as of Flecker's, Theodore T. Zuck's and Todd's or complicated as of Galstaun.

It has to be noted that all the cases in a particular age group did not show the same stage because of the fact that union goes on differently in different subjects.

Summary

During the study of the ages of epiphyseal union in the long bone of the inferior extremity in U. P. subjects, six radiological stages of epiphyseal union were observed through which the diaphysio-epiphyseal space pass. They have been discussed and compared with the stages described by other workers.

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Radiological Diagnosis of Primary Lung Tumours

BY

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An attempt is being made in this paper to present the subject, not in the usual way of describing the radiological findings of a clinical disease label, but as by one, confronted by abnormal or unusual shadows, in trying to throw light on the nature of the opacity, and, in doing this, the diagnosis may be apparent or the nature of the underlying pathologic process may be revealed gradually after further clinical and radiological investigations.

It should be emphasised that interpretation of various densities and translucencies seen in chest skiagrams is not complete without the clinical history being made available to the radiologist, in addition he may require the reports on blood examination and biochemical investigation. It should be understood that the process of arriving at a diagnosis is a cooperative effort by so many concerned.

It should be remembered that in most of the cases it is not possible to come at a conclusion only with postero-anterior view of the chest; further views are essential. Not only this, but special procedures, such as tomography and bronchography may be necessary, sometimes together with bronchoscopic findings.

The tumours of the lungs, both benign and malignant may manifest themselves in various ways. Radiologically, they can simulate majority of the common diseases of the lung and that is why it is essential to correlate the radiological findings with those of clinical examination and other investigations. This should be done as early in the course of the disease as possible to give the patient the best chance to derive maximum benefit of early treatment.

The lung tumours are grouped according to the main presenting feature and procedure of arriving at a diagnosis is given and pit-falls explained.

1. *A Large Homogenous Shadow Occupying whole Hemithorax with Displacement of the heart to the Opposite Side.*—This type of shadow is generally due to massive effusion, but it may be that behind this pleural effusion there may be underlying parenchymatous, mediastinal or an extra pulmonary but intrathoracic mass which may not be apparent. A suspicion should arise specially in those cases, where effusion is blood stained, where it fills rapidly after tapping or where there is no response to usual treatment. In addition to usual views, over-penetrating view preferably with a filter on the normal side may be helpful in bringing out pulmonary or extrapulmonary mass. Radiographic examination may be required after diagnostic pneumothorax. Extrapulmonary tumours such as Ewing's sarcomas of the rib may come to light.



Fig. 1.
Bronchogenic Carcinoma.

Fig. 1 is a P. A. view of a patient presenting cough and dyspnea of 5-6 months duration, taken a few days after repeated tapping of haemorrhagic effusion. It shows collapse of the mid and lower lobes though there is displacement of the heart to the opposite side. Though there is no collapse of upper lobe, it shows very little aeration. There is also visible stenosis of the main rt. lobe bronchus, distal to the branching of upper lobe bronchus. Bronchography and biopsy proved it to be a bronchogenic carcinoma.

2. *A Large Homogenous Shadow Occupying whole of Hemithorax Displacing the heart to the*

same side.—The ribs are crowded with indrawing of chest wall and the diaphragm is raised. This indicates airlessness of the lung with consequent shrinkage in size. A over-penetrating view may show an abruptly disappearing main bronchus. The condition may be caused by pressure on the bronchus mediastinal or hilar gland due to any cause or may be due to blocking of the bronchus by a growth or foreign body. Bronchography will reveal the stenosis of the bronchus and bronchoscopic removal of the tissue will supply the histopathologic confirmation.



Fig. II (a)

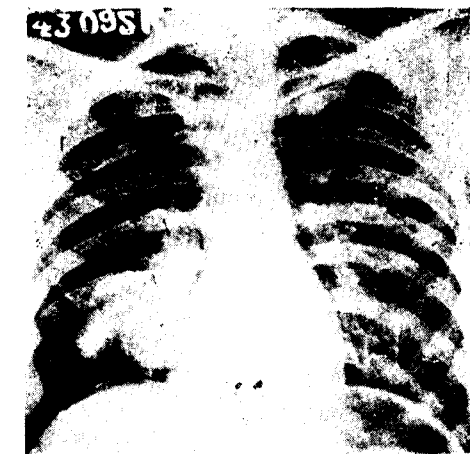


Fig. II (b)

Fig. II K. N. 28 years complaining of pain in right chest, cough, expectoration and fever of 9 months duration, with occasional haemoptosis.

(a) P. A. view shows collapse of right lung with displacement of mediastinum to the same side. Bronchography revealed a growth in right main bronchus which on histology proved to be bronchogenic carcinoma.

(b) Same case after radiation treatment.

3. *A Large Homogenous Shadow Occupying part of one lung.*—This type of shadow may be due to many causes such as mediastinal pleural or intrapulmonary. The mediastinal opacities can be differentiated by their location and by displacement of oesophagus they sometimes cause. The encysted pleural effusion may be recognised by their relation to various interlobar fissures and by the presence of underlying normal vascular and bronchial pattern. Large homogenous opacities due to intrapulmonary lesions can

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be recognised as they occupy normal position of the lobe. They are caused by massive consolidation of the lobe due to replacement of alveolar air by exudation of bacterial or viral origin, pulmonary oedema or occlusion of main bronchus of the lobe by neoplasm or foreign body. X-Ray appearances are the same though the cause

of consolidation may vary. In most cases of bacterial and viral origin, the cause is obvious on clinical history, physical examination and on blood and sputum reports. But there are some cases specially tumours in the early course and some forms of viral infections which do not give rise to gross constitutional symptoms. It is in these



Fig. III (a)



Fig. III (b)



Fig. III (c)

cases particularly one as got to keep in mind the possibility of neoplastic cause. Frequently, a part of the lobe may be consolidated with presence of an ill defined edge and this may happen irrespective of the cause of the process when the consolidation is undergoing resolution, there may be areas

of aeration, the similar type of appearance may be seen when neoplastic consolidation is secondarily infected. Tomography, bronchography and bronchoscopic examinations are most useful in arriving at a diagnosis.



Fig. IV (a)



Fig. IV (b)



Fig. IV (c)

Fig. III (a, b and c) are skaiograms of a patient S. K., female, aged 54 years, with history of pleurisy one year previously and was being treated in T. B. Clinic, developed effusion with underlying consolidation shown by plain P. A. and lateral views. Slightly over-penetrated P. A. view (a) shows that main bronchus of left lower lobe terminates abruptly. Tomography (b) brings this out well and bronchography (c) confirms the filling defect. Lastly, bronchography and histo-pathology of the tissue taken confirmed the diagnosis of bronchogenic carcinoma.

4. *Homogenous Shadow confined to one or more Segments.*—These shadows are caused by consolidation of one or two adjacent segments and differential diagnosis are the same as those of massive consolidation of a lobe.

Fig. IV (a, b and c) are illustrations of a case, K. D., age 49, suffering from fever,



Fig. V (a)

Fig. V (a, b and c) R. L. This patient presented himself with dysphagia as the main feature sometimes accompanied with

cough and occasional haemoptysis of 3 4 months duration. Plain P. A. and Lateral views show consolidation of both apical segments. Bronchography shows filling defect of stem bronchus of these segments.

5. *A Large Circular or Oval Homogenous Shadow.*—These shadows can be (a) mediastinal (b) extra-pulmonary in association with wall of thorax or (c) intrapulmonary.

(a) Mediastinal shadows are known by their location; they may be in the anterior, middle or posterior mediastinum, pulsatile or nonpulsatile. The various causes of these lesions are: different types of benign and malignant lymphadenopathies, aortic aneurysms, secondary deposits, dermoids and rarely hydatids. It should also be remembered that a large mediastinal shadow may be an outstanding manifestation of a small bronchogenic carcinoma which may be overlooked.

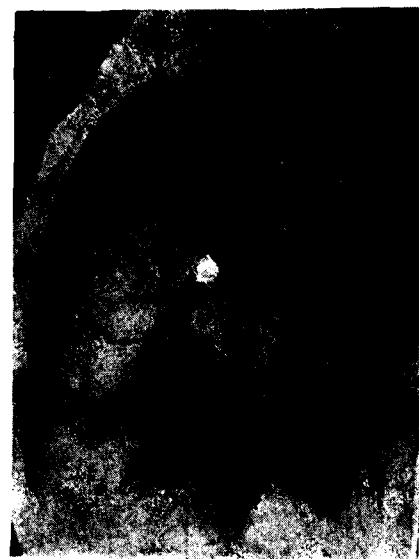


Fig. V (b)

retrosternal pain. (a) Plain P. A. and (b) lateral views revealed a round non-pulsatile mass in the posterior mediastinum. Barium



Fig. V (c)

swallow showed displacement of oesophagus anteriorly and to the left. On these findings, a diagnosis of lympho-sarcoma was given. After a few days, it was noticed that there was atelectasis of right upper lobe and bronchographic examination (c) showed a filling defect of right main bronchus. Histological examination of tissue taken after bronchoscopy showed it to be a bronchogenic carcinoma.

(b) Intra-thoracic but extrapulmonary shadows, apart from the mediastinal shadows are in connection with the thoracic cage, ribs and spine, such as neurofibroma in connection with intercostal or spine nerve roots-hourglass tumour, hydatid cyst of the ribs or neoplasms of the ribs. These tumours should be suspected by their close association with bony parts of the thorax, sometimes causing erosion, separation of adjacent ribs etc. Tomography and bronchography may be helpful and diagnostic pneumothorax may be required though it should be avoided if hydatid is suspected.



Fig. VI

Fig. VI, a P. A. view shows a large round opacity in the left upper zone by the side of the spine. This opacity proved to be an extra-spinal extension of a neurofibroma in connection of the spinal nerve root. Pneumothorax showed it to be extrapulmonary and myelography demonstrated a block in the region.

Fig. VII (a and b) are P. A. and oblique views of an extrapulmonary but intrathoracic tumour occupying right upper zone. Bronchography shows no obstruction in any of the bronchi except that they are displaced anteriorly. This proved to be an hydatid cyst in connection with posterior portion of fourth rib.

There are in this category some more opacities which are in close association with pleura and push it inward in front of them. The usual cause of these opacities, is encysted pleural effusion, but in some rare case, the cause may be tumour of the pleura.



Fig. VII (a)



Fig. VII (b)



Fig. VIII

Fig. VIII is a tomogram of right lower zone. It shows a tumour growing from the pleura and pushing the lung inwards. These tumours may infiltrate the lung as this one did. On resection, this one proved to be a sarcoma of the pleura.

A single intrapulmonary homogenous circular or oval shadow may be parenchymatous solid or cystic—or may be due to interlobar effusion. Lateral and lordotic views and tomography are helpful to

recognise the interlobar effusion. Fluoroscopy may help in differentiating whether the tumour is solid or cystic. The intrapulmonary cystic tumours are generally hydatids or congenital fluid cysts; their size may vary from a small—(half a centimeter diameter) opacity to a huge one nearly occupying half the chest. They are usually silent.



Fig. IX

Fig. IX shows a large solitary hydatid.

A solitary large circular or oval shadow specially in a cancer age patient should give rise to a suspicion of a bronchogenic malignant tumour. Tomography usually helps in arriving at a diagnosis.



Fig. X

Fig. X is a lateral view of a large bronchogenic carcinoma proved by biopsy.

Cause of a filling defect in a bronchus, though in majority of cases, is a malignant growth, it may in some cases be due to benign growths such as adenomas or in rare cases, a non-opaque foreign body, specially in younger age group, where the history of inhalation of foreign body is forgotten. In one case, the cause of obstruction was intra-bronchial hydatid.

Fig. XI (b) is a P. A. view showing a large circular opacity by the right side of the heart, while (a) is the lateral view taken during bronchography demonstrating a filling defect in right lower lobe bronchus at the junction where it gives off the mid. lobe bronchus. Bronchoscopy and the histology showed it to be an adenoma.

6. *A Small Singular or Oval Shadow.*—It should be remembered that these small shadows may be earlier manifestation of the larger shadows discussed in preceding group. The common cause of these solitary



Fig. XI (a)



Fig. XI (b)

lesions in this country is tuberculosis. These lesions are some times known as 'coin' lesions. The other causes of these lesions are, solitary secondary, hydatid, arteriovenous aneurysms, hamartoma and new-growth. These lesions are usually silent for quite a long time and are sometimes accidental findings in routine chest examination. There may be shadows around tubercular and malignant lesions, as well as arteriovenous aneurysms; while hydatids and hamartomas do not show any surrounding striations. Lung Hydatids rarely calcify, but calcification may be present in centre of hamartomas and along the periphery of tubercular lesions.

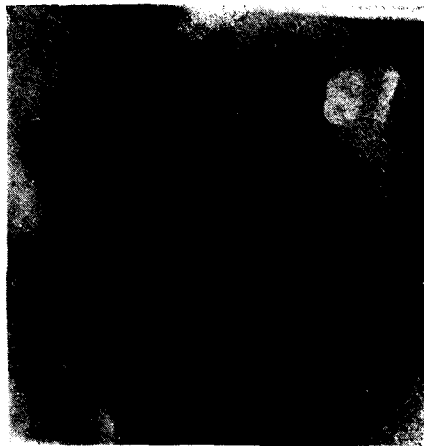


Fig. XII

Fig. XII is a tomogram of a lesion accidentally discovered in a young man. Bronchography did not demonstrate any abnormality. The section of the lesion after lobectomy proved it to be tubercular infiltration.



Fig. XIII

Fig. XIII is a P. A. view of a patient complaining of occasional haemoptysis showing a round tumour below the right hilum. Physical examination revealed a bruit in a small area by the right side of the heart and flourescopy showed pulsation in the tumour. Angiocardiography showed opacification. The case was diagnosed as having an arterio-venous aneurysm of the lung.



Fig. XIV B. N., age 52, came with complaints of cough and haemoptysis of five months duration, loss of weight and weakness. (a) P. A. view shows a small nodular shadow in the left hilar region. Tomogram showed this to be posterior to the left hilum; (b) bronchography revealed a partial stenosis at the mouth of lower lobe bronchus. Bronchoscopy revealed a bleeding growth in this region and was confirmed as bronchogenic carcinoma by histopathology.

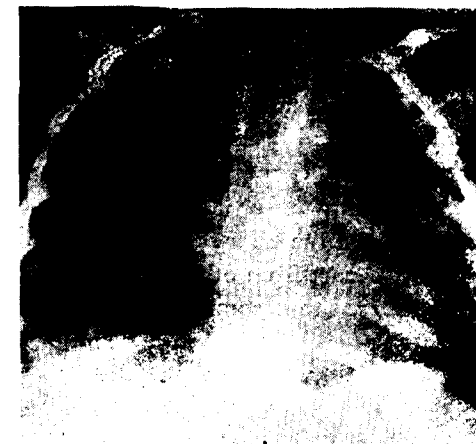


Fig. XV

Fig. XV is A. P. view of a child of three years of age. It demonstrates a round opacity in the right upper zone. This opacity would have been diagnosed as 'primary complex' had it not been known that the child was recently operated for rhabdo-myo-sarcoma of the prostate.

7. *Multiple large Circular or Oval Homogeneous Shadows.*—Common cause of these shadows are secondary deposits of some distant primary. They may be of various sizes. The other cause can be hydatid disease. The differentiation is possible on clinical history and course of disease. Sometimes, it is possible that one of the multiple shadows may be primary while others are secondaries.

Fig. XVI, A. C., age 67, complaining of cough and haemoptysis. P. A. and right lateral views show three large circular opacities on the right side, mid zone. Bronchography revealed a growth in the right bronchus which on histology proved to be a bronchogenic carcinoma.



Fig. XVI (a)



Fig. XVI (b)

8. *Multiple small Circular or Oval Homogeneous Shadows.*—A localised group of these shadows usually poorly defined is seen in tuberculous or in any other inflammatory condition distal to bronchial stenosis which itself may be due to intra-bronchial growth.



Fig. XVII

Fig. XVII, A case of bronchogenic carcinoma of the left main bronchus causing a partial stenosis, shows small shadows of different densities and different sizes, spread over the left lung.

These small shadows may be widely disseminated. They are usually due to cannon ball secondaries, or widely disseminated hydatids.

9. *Large Non-Homogenous Shadows Showing Mottled or Honey Combed Appearances.*—These opacities are usually due to unresolved consolidations and bronchiectasis occupying a complete lobe or part of a lobe. Sometimes there may be a fan shaped shadow spreading from the hilar region towards the periphery. Apart from other causes, it may be remembered that sometimes the underlying cause of these lesions may be bronchogenic carcinoma.

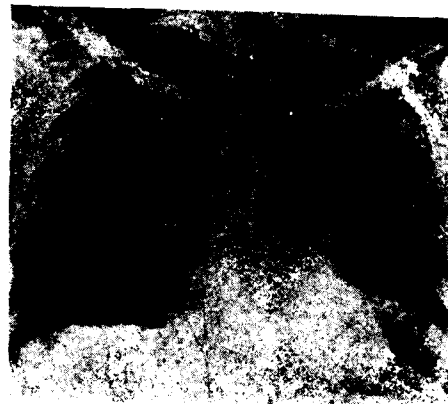


Fig. XVIII (a)

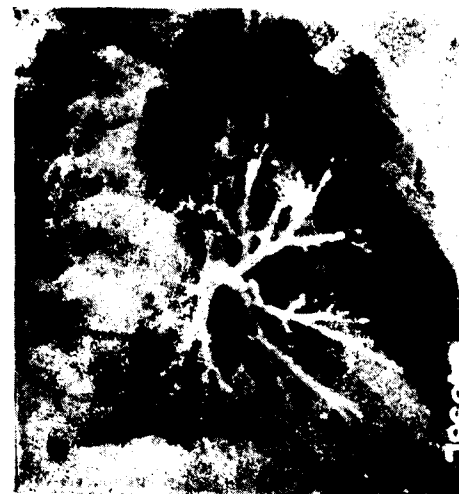


Fig. XVIII (b)

Fig. XVIII. D., age 42 years, complaining of cough, fever and haemoptysis of three months duration. (a) P.A. view shows a fan-shaped opacity spreading from the left hilum towards the base showing honey-combed appearance above the diaphragm. (b) Bronchography shows a block in the apical bronchus of the lower lobe. Bronchoscopy and tissue section revealed a bronchogenic carcinoma.

10. *A large Non-Homogenous Shadow containing Air and sometimes Fluid.*—The usual cause of these shadows is a lung abscess due to infection which is recognised by clinical history, but it should be kept in mind that the infection may supervene an underlying malignancy.

Fig. XIX, R.L., age 50 years, reported with pain right side of the chest and cough. P.A. skiagram shows a large thick-walled cavity with a fluid level by the right side of the heart. Bronchography was unsatisfactory. Bronchoscopy showed a growth which on histology proved to be malignant.



Fig. XIX

tuberculosis. In other cases, the lesion may be due to healed chronic inflammation other than tuberculosis, but in some rare cases the cause may be malignancy. Most of these cases are usually treated as tuberculosis with no response.

Fig. XX, M. N. D., aged 52 years, suffering from cough and fever for four months, being treated for tuberculosis, showed a small fibrotic lesion at the left apex with a tubular shadow going towards the hilum. There was an enlarged gland by the side of aortic knuckle.



Fig. XX (b)



Fig. XX (a)

(a) P. A. view taken during bronchography that posterior apical branch does not fill.
(b) an oblique view taken earlier on the spot film shows a round filling defect in one of the branches of this bronchus. The conclusion was suggestive of a tumour but not convincing. Thoracotomy was done, the resection was not possible on account of frozen condition of mediastinum. However, a gland was removed which confirmed the diagnosis of carcinoma.



Fig. XXI

Fig. XXI, K. K., age 22 years, female came with swelling and deformity of both hands and feet of 18 years duration and hoarseness of voice and was treated for alleged tuberculosis of lungs. There were haemangioma patches in the mucous membrane of the mouth, left anterior pillar and false vocal cords. Radiological report on hands and feet was 'multiple chondromatas'. The lung lesion was suspected to be an arteriovenous aneurysm on account of its surrounding vascular shadows seen in tomogram. Biopsy report of one of the tumours of the phalanx was 'capillary angioma'.

12. *Various types of Intra-Pulmonary shadows Associated with Rib destruction as the Main Feature.*—It has been known that lung tumours specially in apical region gives rise to erosion of the ribs. They are usually known as superior sulcus tumours or Pancoast tumours and erosion of the rib was searched as a confirmation of malignancy. The nature of pulmonary shadow may vary from well demarcated round opacity, segmental consolidation to mottled shadow with marked pleural thickening and rib destruction is secondary. Apart from lung malignancies, other causes of rib destruction are, tuberculosis, osteomyelitis, fungus



Fig. XXII (a)

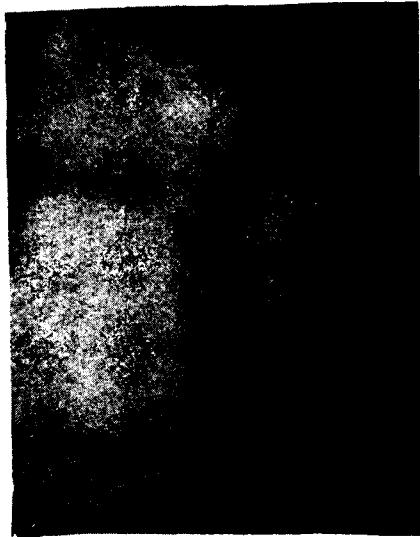


Fig. XXII (b)

RADIOLOGICAL DIAGNOSIS OF PRIMARY LUNG TUMOURS

infection and tumours of the rib itself. But, in some rare case, the rib destruction may be the main feature of lung malignancy.

Fig. XXII. C., of 30 years age, reported with complaints of dull pain in left mid-chest, both front and back. No history of cough or expectoration. Physical examination revealed two hard lumps on the 7th and 8th ribs posteriorly; adherent to the bone and tender.

(a) Radiological diagnosis was caries of the rib with encysted effusion in the lungs on the left side with an old healed lesion in infra-clavicular region. Aspiration

of the mass did not reveal any pus. Bronchoscopy done was normal.

(b) Tomography showed enlarged mediastinum glands at different levels. Lastly one of the hard lumps on the back was removed and histopathologist gave the diagnosis of bronchogenic carcinoma.

There is a large number of other types of shadows seen in the lungs, but they do not usually form part of the manifestation of primary lung tumours. But on some rare occasions a patient may present himself with a tumour in other part of the body, without any symptom referable to the lung.



Fig. XXIII (a)



Fig. XXIII (b)

Fig. XXIII Mrs. B., age 33 years was referred from an outstation hospital for an hindquarter amputation for supposed osteogenic sarcoma in the iliac bone. Her chest was x-rayed in the same hospital and lungs were declared to be clear. As a routine her

chest was again x-rayed on the previous day of the operation. It was noticed that there was an osteolytic lesion of left transverse process of seventh cervical vertebra and small opacity in left mid zone. The operation was cancelled on the

intervention of the radiologist and biopsy taken from the lesion in the iliac bone proved to be a secondary from an adenocarcinoma-bronchogenic?

Summary

The various types of shadows, which are likely to be the manifestation of primary lung tumours are grouped according to their main presenting feature. The differential diagnosis of these shadows is discussed and various stages of procedures of investigations are given and pit-falls pointed out, in an

attempt to arrive at a diagnosis with a view to confirm or exclude primary lung tumours.

The author's thanks are due to the Medical Superintendent, Irwin Hospital, New Delhi, for his kind permission to use the records. He is grateful to his colleagues for their willing co-operation. He is indebted for this method of presentation of the subject to the book "*Principles of Chest X-Ray Diagnosis*" by 'George Simon'.

Radiological Aspects of new growths of the Larynx*

BY

SATYEN BASU, M.B. (Cal.), D.M.R. (Lond.)

Radiological study of tumours of the pharynx and larynx has come comparatively recently into vogue and thanks are due to Beclasse in Paris who mainly elaborated it. It may pertinently be asked how radiology can help in a region easily accessible to an expert for inspection. Presentation of the following skiagrams is an attempt to answer that question. For brevity only lateral skiagrams which are more useful would be shown.

The cricoid cartilage in front of the body of the sixth vertebra is another prominent landmark. On it sits the arytenoids from which the line of the aryepiglottic folds can be traced upto the tip of the epiglottis. The outline of the thyroid cartilage partially calcified is shown and through it the ventricular and vocal folds with the sinus of the ventricle in between. The soft tissue shadow in between the anterior surface of the vertebrae and this air shadow should be studied carefully. Above it is narrow and only a few millimetres thick but at the level of the upper border of the fifth vertebra it broadens out. Normally the width of this soft tissue shadow should not be more than the width of the vertebrae in the region.

Let us now study the skiagrams of a few patients in the Ear, Nose and Throat department of the Chittaranjan Cancer hospital. Skiagrams of Case no 52/33 (Fig. II)



Fig. I--Normal.

Let us first study a normal skiagram as in Fig. I. The cervical vertebrae stand out as a prominent land mark to take a bearing from, and in front of this is the dark shadow of the pharyngolaryngeal air space. Above, this air shadow is roofed by the sphenoidal air sinus, and below, it is continuous with the trachea. The epiglottis juts in from its anterior aspect forming the vallecular crevice between itself and the tongue the outline of which continues forward as a curved line convex above.

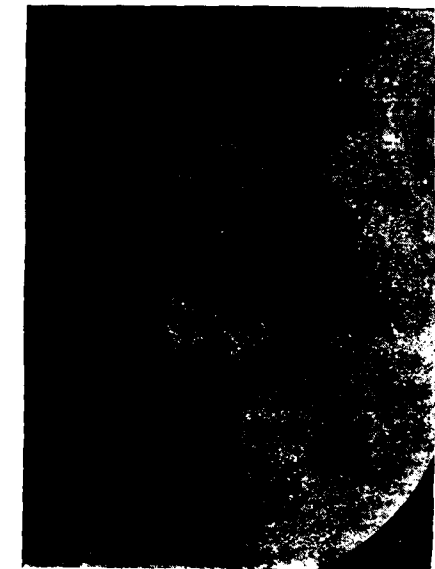


Fig. II

*Presented at the Scientific Session Medical College Reunion 1955.

(1) In the positive prints presented here, dark would be light and *vice versa*. S. B.

shows that the shadow of the epiglottis is not sickle shaped with a pointed end as it should be but rather a globular mass. The specialist's findings record, there is a proliferative growth at the upper margin of the epiglottis.



Fig. III

Case No. 53/2530. Here, the skiagram (Fig. III) shows not only distortion of the epiglottis but also that the vallecular space is practically obliterated. Our suspicion of a proliferative growth involving both epiglottis and vallecula is confirmed by recorded findings.

But look at the skiagram of Case No. 52/103 (Fig. IV)². The findings with a laryngeal mirror was that of a proliferative growth involving both epiglottis and vallecula and that interior of the larynx could not be seen. In the picture we can see the lower border of this growth, which shows that though large the growth has not encroached on the region of the cords.



Fig. IV



Fig. V

Skiagram of Case No. 53/2950 (Fig. V) shows distortion of the posterior outline of the aryepiglottic fold and encroachment on the air shadow immediately in front of this. Findings tally with the clinical findings, that of a growth of the aryepiglottic fold.

(2) In (Fig. IV) Case No. 52/103 is replaced by 56/1821.

Interpretations of skiagrams in case of larger growths involving several structures as in Case No. 53/1172 are more difficult. Let us first note the findings with a laryngeal mirror. It is a proliferative growth involving the aryepiglottic and pharyngo epiglottic folds, false vocal cords and pyriform fossa. There is encroachment on cavum laryngis. In the skiagram (Fig. VII) we see a large irregular shadow behind the concave line of the epiglottis. The prevertebral soft tissue shadow has tended to be wider, which we expect in a cases of growth of the pyriform fossa. The ventricle is practically intact and it is likely that involvement of the false vocal cords is by extension from above.



Fig. VI

Now look at the skiagram of Case No. 54/3067 (Fig. VI). The ventricle has become narrow and slit like by encroachment from the true and false cords which are disorganised and have lost their clear outline. So the trouble was at or near the ventricular folds. The specialist's findings, that of a growth involving the true and false cords endorsed it.



Fig. VII

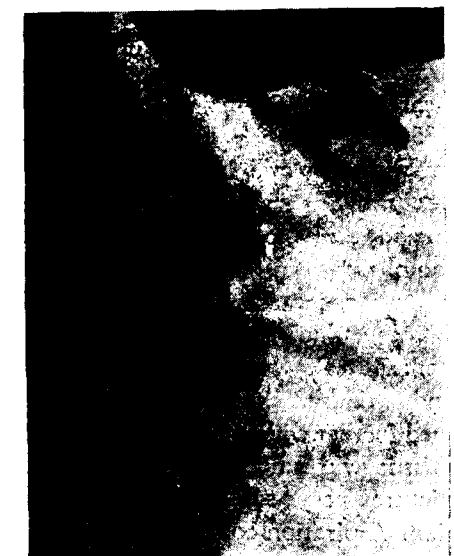


Fig. VIII

In the skiagram of Case No. 53/1295 (Fig. VIII) on the other hand the striking feature is widening of the prevertebral soft tissue shadow. This is presumably a growth of the hypopharynx and infiltration of adjoining structures is expected. The laryngologist recorded it as a growth of aryepiglottic fold, arytenoid, pyriform fossa and hypopharynx.

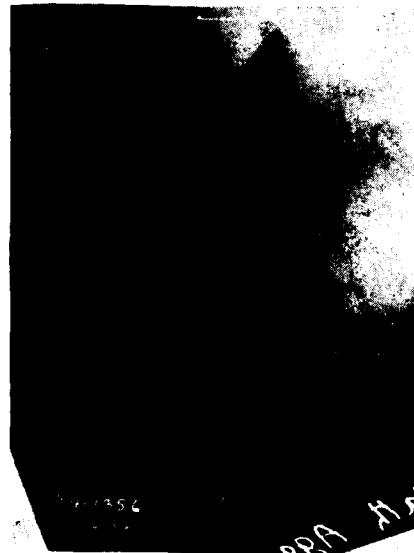


Fig. IX

It would be interesting to follow up a few cases. The first skiagram of Case No. 54/1356 (Fig. IX) was taken on 18-6-54. From widening and irregularity in outline of the prevertebral soft tissue, it can be presumed it was primarily a growth in the region of pyriform fossa and hypopharynx. It was so confirmed by endoscopic findings and biopsy, and deep xray treatment was started. But the patient became worse. A second skiagram on 5-7-54 (Fig. X) showed further widening of the prevertebral soft tissue with smoothening of the outline, a picture very suggestive of pus under tension. Aspiration confirmed this.

Here is another skiagram from Case No. 52/632 (Fig. XI) taken on 22-4-52. Laryngoscopic finding is recorded as a proliferative growth of vallecula and epiglottis combined into a huge mass. Presumably cavum laryngis was not in view, but we can suggest from the picture that the ventricular folds are involved while the hypopharynx is unaffected. Such localisation helps a good deal in planning of



Fig. X

radiotherapy. He had a full course of treatment by deep X-ray and another skiagram (Fig. XII) was taken on 11-11-52. It shows that the large irregular mass has completely cleared up and that the epiglottic fold has irregular outline presumably



Fig. XI

from fibrosis. This is further suggested by the epiglottis being dragged backwards widening the vallecular space thereby.

We thus see that skiagrams of the larynx can be helpful in several ways.

1. It can corroborate or confirm the findings of a laryngologist.
2. It can show the downward extent of a growth often better than a laryngeal mirror.
3. It gives a good perspective of the growth in relation to the surrounding structures, findings extremely valuable if surgery and more so if radiotherapy is contemplated.

Acknowledgement

Thanks are due to Dr. Subodh Mitra, Director, Chittaranjan Cancer Hospital for permission to use hospital records.



Fig. XII

Correspondence

From

Dr. R. F. SETHNA,
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To

THE EDITOR-IN-CHIEF
Indian Journal of Radiology,
110, Mount Road, MADRAS-18.

PLANNING

Dear Sir,

I congratulate you on your bold and candid criticism in the Editorial published in February 1958 issue, of some of our failings, especially that dealing with members, who having consented to contribute a scientific paper, fail to turn up at the last moment at the Annual Congress without giving previous intimation.

I feel, however, that you will allow me to clarify my position, as I was unable to attend the Congress and read a paper on "X-ray treatment of Carcinoma of Oesophagus—Preliminary Report on Pendulum Therapy". This was due to circumstances beyond my control. The J. J. Hospital authorities informed me on 27th January 1958 that my presence in the X-ray Department was indispensable and hence I could not be granted leave. I intimated this news to the Hon. General Secretary of the Congress (Dr. Khanna) on 3rd February 1958, regretting my inability to attend. My form 'B' was sent on 11-11-'57.

No news of acceptance of my paper was received by me till I received the Railway Concession form on 24th January 1958. The list of accepted papers was attached to the concession form. The organisers owe it to the members that they receive intimation of acceptance or rejection of their paper in good time.

I have been very critical of the members on the same subject in my Editorial published in February 1956 issue of our Journal, during the time I was the Hon. General Secretary of the Association.

This scathing Editorial resulted from this yearly repetition of this particular and other failings of our members which tended to disorganise the programme and which did not escape the notice of foreign Radiologists. This Editorial was very much resented to by some members unaccustomed to hear truth about themselves.

Some of us who have attended the International Congresses have shown great care to observe the correct code of conduct in dealing with them. During my six-year term as General Secretary, I have admired the way the internationally famous medical men have shown great humility and extreme courtesy in replying to my letters even though they have been extremely busy with their work. Unless we observe the same care in our dealings in the National Congress and set a good example it is futile to expect any improvement in the existing deplorable attitude of senior and junior members alike.

Yours faithfully,

R. F. Sethna.

*The Editor does not take any responsibility for opinions expressed in these columns.

ANNOUNCEMENT

Symposium on Fungus Diseases in India

It is proposed to hold a symposium on "Fungus Diseases in India" under the auspices of the School of Tropical Medicine, Calcutta in the third week of December, 1958. The symposium will be divided in the following section:

1. Internal Medicine.
2. Paediatrics.
3. Gynaecology and Obstetrics.
4. Dermatology.
5. Surgery.
6. Medical Mycology.

Papers are invited for the presentation at the symposium. An abstract of the paper (in duplicate) not exceeding 300 words, should be sent to the Director, School of Tropical Medicine, Calcutta, not later than September 15, 1958, and the full paper (in duplicate) should be sent by November 15, 1958. Dr. C. G. Pandit, Director, Indian Council of Medical Research, New Delhi, has kindly consented to preside over the symposium. Scientists from the U. S. A. and U. K. are expected to participate in the symposium. For any further information and details regarding the symposium, kindly write to the Director.

Abstracts of Radiological Literature

P. G. Keates and O. Magidson, Dysphagia associated with sclerosis of the aorta. *Br. Jour. Radiol.* April 1955, 28: 184-190.

The authors present seven cases in which dysphagia was associated with pressure on the oesophagus from a sclerotic and unfolded aorta. All the patients were elderly women in whom four had arteriosclerotic heart disease with failure. In three cases, other causes of dysphagia were excluded by oesophagoscopy. Most of the patients complained of dyspnoea of the cardiac type of angina. Difficulty of swallowing was noticed particularly with solid food. Oesophagoscopy showed no changes except those due to pressure from the heart and aorta.

Unfolding of the aorta produces widening of the aortic arch, in the posteroanterior view. Below this point, the aorta either describes a wide curve, convex to the left, a reversed—C Course or else swings back to cross the midline above the hiatus diaphragmatica, returning to the mid-line lower down, a reversed. S course. In the former type, in the left anterior oblique view, the oesophagus lies within the open curve formed by the aorta and shows a tapered narrowing above the hiatus. In the latter type, in the left anterior oblique view the aorta takes the form of a question mark, the oesophagus is narrowed and barium cascades over the ridge caused by the aorta, and in the right anterior oblique view the aorta resembles a sickle with a short handle and pushes into the back of the oesophagus.

Most commonly there is no hold up of barium to the stomach, but in a proportion of cases, in which there is a hold up at a

level where the oesophagus was impressed by the aorta, the latter must clearly be responsible for the hold up. But the radiological findings above described are found quite commonly in elderly patients and very few people complain of dysphagia which seems to throw a doubt on the significance of dysphagia associated with the sclerotic aorta.

In conclusion, the authors hold that in an elderly patient, particularly a hypertensive female, a complaint of dysphagia associated with a sclerotic aorta and hold-up of barium should suggest the possibility of the dysphagia being due to the impression of the aorta on the oesophagus, but as the condition is rare, the diagnosis should not be made until other causes of dysphagia have been eliminated.

20 radiographs.

S. N. Deboo, Bombay.

Theodore E. Keates and Howard L. Steinbach. Patent Ductus arteriosus. A critical evolution of its Roentgen signs. *Radiology.* April 1955, 64: 528-537.

The authors give an excellent review of the roentgenology of patent ductus arteriosus by various authors including Donovan, Johnson and Salzman, and Neuhauser. He also gives a critical study by 100 cases, of their roentgenograms, and their salient features.

Their technic consisted of at least an anteroposterior or posteroanterior film of the chest and a left lateral projection.

Cardiac enlargement was present in 73 per cent of cases, and the chambers most frequently enlarged were the left ventricle and the left auricle in 67 per cent. 42 per cent also showed right ventricular enlargement. Differences in estimation of cardiac and chamber enlargement averaged 15 per cent. 50 per cent of the electrocardiograms were abnormal, where as x-rays showed 73 per cent of the hearts enlarged. 30.7 per cent of the electrocardiograms showed left ventricular enlargement as opposed to 68 per cent of the cases studied by x-ray examination. 6.7 per cent of the electrocardiograms showed right ventricular enlargement as compared with 42 percent in the x-ray films studied, so that cardiac and chamber enlargement was observed in a larger number of patients than the electrocardiograms would suggest.

Enlargement of the pulmonary outflow tract, including the main pulmonary artery, the right and left pulmonary arteries, and the peripheral pulmonary vasculature were constantly noted. 68 per cent of cases showed enlargement of the main pulmonary artery. The enlargement of the pulmonary veins was found to be a fairly reliable indicator of a left-to-right intracardiac shunt.

The infundibulum sign was found to be unreliable, being detected only in 25 per cent of cases, and at best this sign is only confirmatory. Elevation of the main and left pulmonary arteries and increased size of the aorta were not felt to be reliable signs.

The size of the ductus arteriosus was found to correlate well with the degree of cardiac enlargement and pulmonary vascularity in the various age groups, and as

the patient grows older, the diameter of the ductus increases with the increase in body size.

8 radiographs. 2 charts.

S. N. Deboo, Bombay.

J. B. Kinmonth, R. A. Kemp Harper, and G. W. Taylor. Lymphangiography by radiological methods. *Jour. Fac. Radiology.* April 1955, 6: 13-23.

Human lymphatics may be visualized by the use of the dye "patent blue". Diodone may be injected directly into the lymphatics prepared in this way. In the lower limb 5-6 ml. of 70 per cent. Diodone is injected into the dye-filled lymph trunks, after a transverse incision on the dorsum of the foot 1½ inches proximal to the toes, with the patient in the Trendelenberg's position. In the pelvis, a transverse incision is made below and lateral to the pubic spine, and one of the efferent blue dyed lymphatic trunks is freed on its anterior aspect and sides, and about 8 ml. of diodone is injected. For the upper limb, the injection site favourable is near the elbow. A transverse incision is made just below and slightly medial to a antecubital skin fold, and about 1 or 2 ml. of diodone are injected into the blue dyed lymph trunks. Examination is more difficult when the thicker parts of the body such as the pelvis, abdomen and thorax have to be radiographed.

Small quantities of opaque medium such as 1.0 to 1.5 ml. give good delineation of the lymph vessels when there is no dilatation. If however gross dilatation and varicosity exists, a much larger quantity may be necessary to demonstrate all the ramification of these vessels, and to outline the more proximal lymph vessels in leg and arm.

Examples of lymphangiograms of normal lymph trunks, of a patient with lymphatic oedema and reflux of intestinal chyle, and of a patient with congenital multiple arteriovenous fistulae in the lower limbs are illustrated. Normal and abnormal patterns of lymphangiograms of the pelvis and upper limbs are illustrated and discussed.

11 radiographs. One photograph.

S. N. Deboo, Bombay.

Russel Wigh and Eleanor, D. Montague.
Evaluation of intrapulmonic adenopathy in sarcoidosis. Radiology, June 1955. 64: 810-817.

The authors review the literature, and describe the pathological process. They investigated 103 cases, and found 50 cases of sarcoidosis with intrathoracic lymphadenopathy. Kveim tests were positive in 79 per cent, and 74 per cent had negative Mantoux test. Skin findings characteristic of erythema nodosum occurred in 6 per cent. Studies concerning the relationship of the 2 conditions indicate that as high as 25 per cent of sarcoid patients have erythema nodosum at some time during the course.

Intrapulmonary adenopathy is present in 72 per cent of cases of sarcoidosis with

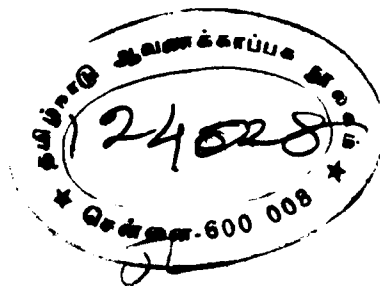
intrathoracic lymph node enlargement as seen on the initial roentgenograms and in as high as 80 per cent of the cases when progress roentgenograms are considered.

The x-ray changes are more evident on the right than on the left side. The predominant feature is a distinct increase in the width of the apparent pulmonary artery shadow, as well as a lobulated or irregular contour along a part of the course of the vessel. At the distal extremity of the adenopathy along the right descending pulmonary artery, an abrupt transition is frequently seen between the enlargement caused by the masses and the shadows of the smaller branches of the pulmonary artery.

It is important to recognise how infrequently the anterior mediastinal nodes are affected in sarcoidosis (4 out of 50 cases) and how often they are enlarged in the neoplastic group (28 out of 42 cases). The absence of intrapulmonary lymph node enlargement plus the presence of anterior mediastinal glands is against the diagnosis of sarcoidosis. The typical Sarcoidosis pattern is represented by the combined presence of intrapulmonary and hilar nodes and the absence of anterior mediastinal nodes.

12 radiographs. 3 tables.

S. N. Deboo, Bombay.



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Statement about ownership and other particulars about newspaper (INDIAN JOURNAL OF RADIOLOGY) to be published in the first issue every year after the last day of February.

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I, Mr. R. Ravai Manickam, hereby declare that the particulars given above are true to the best of my knowledge and belief.

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Signature of Publisher.

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