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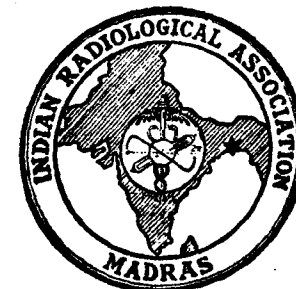
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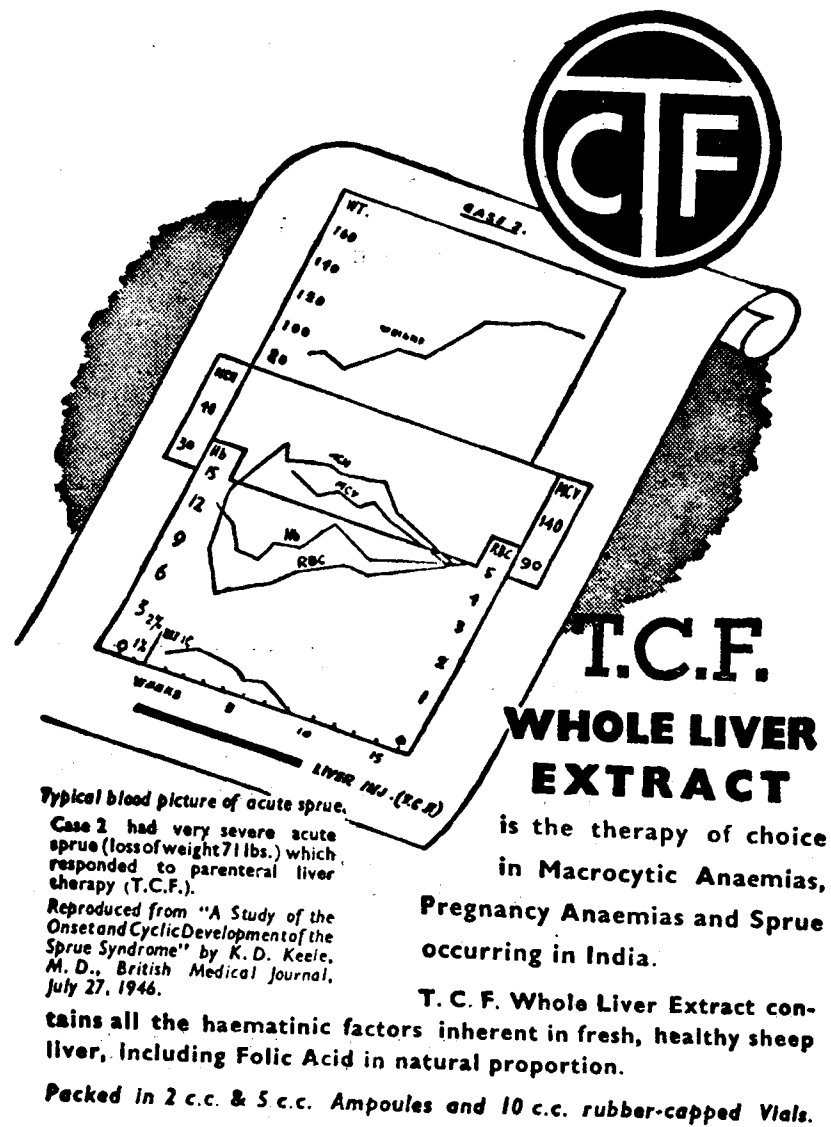
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February, 1948

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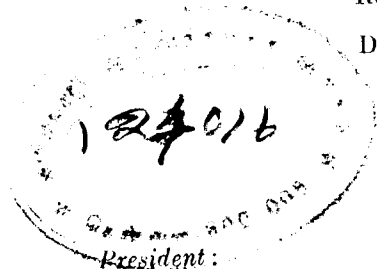
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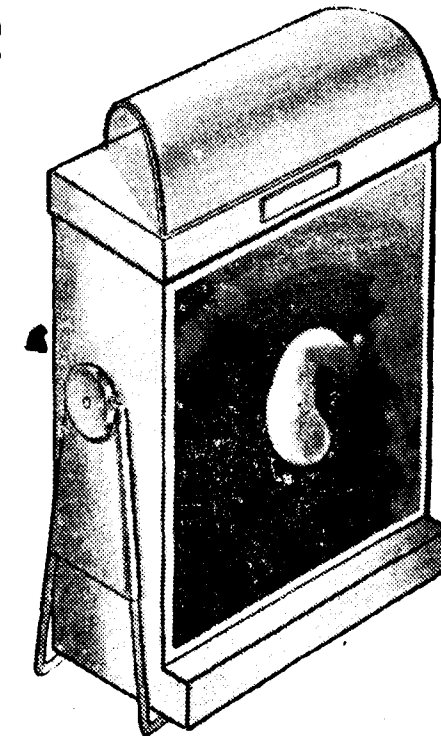
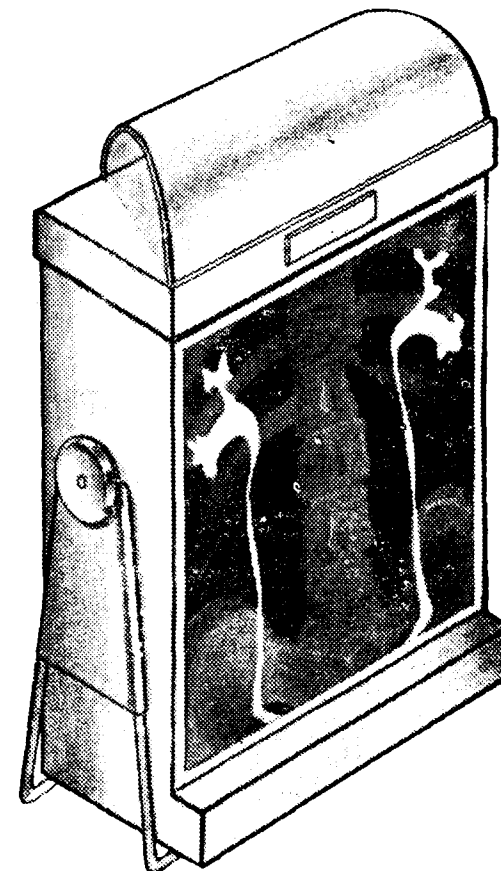
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FEBRUARY, 1948

No. 1.

Pancreatic Calculi

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HON. RADIOLOGIST TO THE G.T. HOSPITAL, BOMBAY.

TEACHER IN RADIOLOGY FOR THE D.M.R. & THE D.M.R.E. (BOMBAY).

IN recent years, we have witnessed an increased interest in diseases of the pancreas, and a tremendous advance in medical, surgical, biochemical and radiographic techniques. In the past few years, the technic of radiography of the pancreas has been immensely improved. There is not only the plain postero-anterior film, but also there is Twin-ing's method of the lateral radiography of a barium filled stomach visualising a triangular filling defect due to the pancreas itself. Then there is lateral radiography with air inflation of the stomach, then there is fluoroscopy of the diaphragm and lung bases for cases of acute pancreatitis. The pancreas has been visualised incompletely after induction of pneumoperitoneum, and after the injection of air or oxygen retroperitoneally. Its duct system has been occasionally visualised by

reflux during cholangiography, and by retrograde filling during duodenoscopy. Barium enema has been found to give evidence of steatorrhea in chronic pancreatitis.

Thus has Radiology come to play an important part in the recognition of pancreatic diseases.

Pancreas is an organ that is usually shown radiologically to be the site of pathological processes, not directly as in the lungs, stomach or the kidneys, but by indirect methods, by effects on the neighbouring contiguous structures, and in most instances as for example in carcinoma of the head of pancreas, the changes produced in other organs are the only significant signs by which the disease is diagnosed. The only exception is pancreatic calculi, which are directly shown within the pancreas. I wish to present these cases of pancreatic lithiasis, because first

of all they are rare, secondly they exhibit interesting points, particularly complications, thirdly because they are of importance from the X-ray point of view. It is peculiar that this condition is not frequently mentioned in the Radiological journals, and even the Radiological text books describe the lithiasis in a few lines. Published cases of pancreatic lithiasis are not many, and a complete satisfactory picture of this entity and of its complications has not yet been established. This infrequent mention in the Radiological journals and the meagre description in the text books indicate the desirability of reporting on individual cases.

This paper is presented from the following view points. Firstly the multiple diffuse pancreatic calculi in Case No. I offer an opportunity to study radiologically the anatomical relationships of the pancreas to the gall-bladder, to the kidneys, to the stomach and to the duodenum. Secondly the reasons are given why pancreatic calculi are so infrequently diagnosed, and why some cases are not spotted. Thirdly complications such as pancreatic cyst and gastrointestinal hemorrhage show the importance of looking for such pancreatic calculi.

Let us first study the Roentgen anatomy of the pancreas. The head of the pancreas overlies the first and second lumbar vertebrae, fitting into

the concavity of the duodenal loop. From the head the organ extends diagonally upward into the left upper quadrant. The body of the pancreas reaches above the lesser curvature of stomach. The tail of the pancreas crosses the upper part of the left kidney, and extends to the hilum of the spleen, where it is in direct relation with the splenic flexure and the colon. In the dissection room the pancreas presents constant relationships to these organs, but in the living the factors of posture change its roentgen relationships.

The stones in the pancreas are of unusual interest to the Radiologist, because unlike other conditions, X-ray investigation is the only definite method, and the best method of pre-operative diagnosis. In the past they were rarely diagnosed during life. About two hundred or a few more cases have been reported, but very few of these were correctly diagnosed except at the operation or at the post-mortem examination. In recent years, however, X-rays have definitely established the pre-operative diagnosis of pancreatic calculi.

The pancreatic calculi show usually a high calcium content. This fact led MAYO ROBSON in 1904 to suggest the use of X-rays in their diagnosis. It was he who first called our attention to the large amount of calcium carbonate in pancreatic calculi (50%) and who emphasised that pancreatic

calculi ought to be shown by X-ray investigation, because of the radio-opaque calcium carbonate. Here it is interesting to know that the normal pancreatic secretion contains no calcium carbonate. It was not until 1912 that ASSMANN found pancreatic calculi in post-mortem cases, and it was he who was able to demonstrate the calculi on radiographs taken of the patient.

As pancreatic calculi are so uncommon, and do not occur often enough, that one can study them from all points of view from his own solitary case or cases, it is important to study the reported cases especially the reproductions of X-rays accompanying the reported cases.

Location is a very important point, and is very helpful in arriving at a diagnosis. Roughly the stones lie, in a great majority of cases, below a horizontal plane drawn at the upper margin of the body of the first lumbar vertebra, and above a horizontal plane passing through the lower border of the body of the 3rd lumbar vertebra. In some cases (as in my case) the stones lie above the upper plane, for instance, in the tail of pancreas, but in no instance are the stones observed below the lower plane. Calculi may be found in any part of the pancreas, but the favourite site is located in the ducts, especially at the point where the main Duct of Wirsung passes through the

duodenum. Although they are commonly seen in the head and in the Duct of Wirsung, they may occur anywhere in the gland. In some cases, as in one of my cases, the entire pancreas is filled with calculi.

Pathology:—The pancreatic calculi are organic (lime salts) and inorganic (containing calcium carbonate). The pancreatic calculi are classified in 2 categories: (1) True calculi are those found in the pancreatic ducts and ductules and are the result of retention and stasis of pancreatic secretion, and inflammation of the pancreatic ducts and may be associated with atrophy and fibrosis of the organ. These true lithiasis correspond to stones in the bile ducts, salivary ducts and stones in the ureters. False stones are calcifications primarily within the parenchyma usually preceded by a pathological disturbance such as acute or chronic pancreatitis.

Although pancreatic calculi are radiologically a distinct entity, its clinical significance in great measure depends on the associated pancreatic disease and insufficiency. Stones have been found in association with pancreatic cysts, and with carcinoma of the pancreas. There may be changes in the pancreas secondary to the presence of calculi, these are atrophy, fibrosis and cystic changes.

True pancreatic calculi are rare, the false pancreatic calculi are even

rarer, as only very few cases of pancreatic calcifications other than pancreatic calculi are reported in the literature.

The clinical signs and symptoms are frequently vague and often not reliable. The most important and common symptom is pain, ranging from obscure epigastric pain to severe colic, and is often referred to the back or shoulders and to the left side. Sometimes the pain in the epigastrium comes on after meals, and this pain is accentuated by taking food. In three cases, No. 1, No. 2 and No. 4, the pain increased after food. In some cases the pain is so severe that the patient takes to drinking alcohol which seems to relieve the pain for a time. Even the patient may become a morphine addict. Nausea and vomiting are met with in acute attacks. Jaundice is met with, but is usually not characteristic. If there is considerable pancreatic damage, there is diabetes and steatorrhea. The blood sugar may be normal or may be high. The islands of Langerhans may be affected, although usually late in the process. Secondary fatty changes may occur in the liver. Marked weight loss, wasting and cachexia may occur in pancreatic lithiasis, with advanced pancreatic insufficiency. Tuberculosis and other complications not infrequently supervene. Pulmonary tuberculosis has been reported in several cases, but whether this was coincidental or

not has not been definitely established. In case No. 1 presented, there was a strong family history of lung T.B. in father and brother, and clinically the chest showed some deficient air entry in apices, but the X ray showed no evidence of pulmonary T.B. CRILE and JAFFE report severe vomiting of blood and melaena in a case of pancreatic calculi.

As compared with pancreatic calculi as a rarity, calcium shadows from other sources in the region of the pancreas are extremely frequent, as for example gall-stones, calcified mesenteric glands, renal calculi etc. so that the diagnosis of pancreatic calculi is not thought of. The clinical diagnosis of pancreatic calculi depends upon the radiographic demonstration of these calculi in the pancreatic region. Pancreatic calculi are usually sufficiently radio-opaque and dense enough to cast shadows. However when the clinical disease is not suspected, shadows of stones in the pancreatic region may likely be misinterpreted. Cases have been reported where the patient was operated upon with a diagnosis of renal calculi with negative results. Then the diagnosis was changed to gall-stones, and the patient was operated upon again with negative results. Subsequently the diagnosis was changed to that of pancreatic calculi. This again emphasises the necessity of looking for them in such cases or in all obscure cases

with upper abdominal symptoms. The calculi can be demonstrated on any good quality film, especially if Bucky is used. The possibility of pancreatic calculi should not be overlooked when the pain is typical in location and radiation.

In all cases of upper abdominal symptoms with a query peptic ulcer diagnosis or not, a plain scout film of the abdomen is necessary, and should be made before giving a barium meal. As the patients have usually upper abdominal symptoms, epigastric pain usually increased by food and drinks, they are referred for a barium meal investigation or for gall-bladder investigation. The pancreatic calculi may be obscured, because of location, if barium is first given, before a plain film is taken. This point shows the importance of taking a preliminary film in all investigations of cases for upper abdominal symptoms, particularly in cases that appear to be clinically obscure-vague attacks of abdominal pain or where there is diarrhoea with fatty stools, or where there is enlargement of the liver, or jaundice of uncertain origin, or diabetes

Such a plain film should be followed by a complete gastro-intestinal study, cholecystography, and pyelography. The films should be taken with barium in the stomach in lateral and oblique projections, as well as in

antero-posterior and postero-anterior projections. As the duodenum forms a loop round the head of pancreas, if pancreatic calculi are suspected, the duodenum should be visualised to observe its relationship to the suspected calculi shadows. The barium meal study usually locates the pancreatic calculi in the duodenal curve. In some cases, however, the barium in stomach is likely to obscure any stones which may be present, when, a barium meal may not be satisfactory. In such a case duodenal tube may be passed and barium introduced into the duodenum, before taking X-rays, to give the relationship of the duodenum to the head of pancreas, instead of giving the barium meal by the mouth. The visualisation of the gall-bladder and the pyelographic studies would establish the anatomical relationship of these organs to the pancreas.

Radiological characteristics of pancreatic calculi.—1. In most cases they appear below the level of the upper margin of the 1st lumbar vertebra and above the upper margin of the 3rd lumbar vertebra. A case reported here shows the calculi in the tail of the pancreas as high as the level of 11th dorsal vertebra. Here the normally high position of the tail of the pancreas in the upper left abdominal quadrant has to be kept in mind.

2. They vary considerably in size, some are minute, others medium, while others might be larger, but as a rule the size is hardly larger than half an inch.

3. They are usually multiple, but in rare cases they may be single. One case reported here shows more than a hundred calculi, and those in the head cannot even be counted. These multiple calculi vary in size from minute concretions to larger masses, and they occupy the main duct and the smaller ductules. On the other hand there might be a single calculus. Such a single stone may be located in the body or in the head of the pancreas. With such a single calculus, position is the most important factor in diagnosis. Such a single calculus is very likely to be interpreted as a gall-stone, renal calculus or a calcified gland.

4. They are of irregular shape and strongly resemble calcified glands.

They may be round, or irregular, or even faceted, or even fragmented. It may be difficult or even impossible in certain cases to differentiate them from calcified glands. When they are faceted, they closely resemble gall-stones in size and shape and may have even less dense centres. In case No. 1 reported, they are mostly round, but in the tail some look like faceted ones. Case No. 4 shows faceted stones.

5. They may be traced from their presence in the head of pancreas to the right of the spine, then across the spine, to the left of the spine following the course of the body and tail of the pancreas.

6. They are best shown in a plain or flat film, and may be obscured if barium is introduced into the stomach. The calculi in the head of the pancreas, however, could be seen lying within the duodenal curve.

7. The shadows of the pancreatic calculi are very dense owing to the large amount of calcium carbonate. They are usually more dense than calcium containing gall-stones, although they do not appear to differ much in density from renal calculi.

8. A lateral view of the spine and abdomen shows the calculi lying just anterior to the spine from the 12th dorsal to the 2nd lumbar vertebra.

9. Their favourite site is the ducts, particularly of the head of the pancreas.

10. They are located in groups close to the spine.

11. If there is calcification of the costal cartilages, the pancreatic calculi would appear in the projection of the calcified costal cartilages, and might therefore be mistaken for calcification of cartilages.

Why are pancreatic calculi so infrequently diagnosed?

The reasons are: (1) The condition is rare, as the literature shows; (2) the patients are referred for barium meal investigation as a routine for upper abdominal symptoms, chiefly epigastric pain, and during the rush of routine, the plain film of the abdomen is frequently omitted from the gastro-intestinal examination. In such cases the barium meal obscures the pancreatic calculi. However, if visible with careful investigation, calculi or calcifications in the region of the pancreas might be mistaken for barium residue in the stomach or in the small intestines; (3) they might be confused with calcifications elsewhere, for instance, for calcified costal cartilages, particularly if the pancreatic calculi appear in the projection of the calcified costal cartilages; (4) they are likely to be missed if they are small; (5) they may be covered by the stomach shadow, and particularly if they are located in the body and the tail of pancreas and absent in the head, then they might be projected to the left of the greater curvature. The left quadrant is a region which, one is likely to overlook even more frequently than the duodenal curve; (6) the failure to diagnose them is due to the absence of familiarity with their location, and the lack of personal experience of X-ray appearances of pancreatic calculi, because of their rarity.

Differential diagnosis: The diagnosis of pancreatic calculi is not difficult. They usually outline the gland in its usual position, particularly when they are multiple.

1. The first condition likely to confuse one is costal cartilage calcifications. The calculi, extending from the head of the pancreas, across the spine, to the tail of pancreas at the spleen, particularly as they are in groups, lying anterior to the spine, should not be mistaken for costal cartilage calcifications. An oblique view or stereoscopic films would be helpful in the differential diagnosis. The costal cartilage calcifications are bilateral, and more linear, mottled, lie obliquely in the line of costal cartilages. The respiratory movement of the costal cartilages is quite characteristic.

2. Gall-stones must be ruled out first of all. The pancreatic calculi shadows are much denser than those caused by gall-stones, besides scattered throughout the gland, their course from right to left across the spine is quite typical. Cholecystography will show the pancreatic calculi lying outside the visualised gall-bladder.

3. Renal calculi must be excluded. They lie only on one side, and even if bilateral, they are not visible across the spine, and pyelography differentiates the renal calculi from pancreatic calculi. The lateral view will show the renal calculi overlying

the lumbar spine. The pancreatic calculi on the other hand are multiple, lie in the course of pancreas from right to left and over the spine, barium meal will show their relation to the duodenal arc, and lateral view will show them lying in front of the spine.

4. Calcified lymph glands may be difficult to differentiate from renal calculi. Their texture, shape, mobility and shift of their shadows would be helpful points in the differential diagnosis.

5. Tuberculous kidney calcifications could be excluded by pyelography which would show moth-eaten spider-shaped pelvis, changes in ureter (beading, loss of pelvic curve etc.) in T.B. kidneys.

6. Calcifications in the liver—intrahepatic calculi—are also rare and they are distributed over a wide area of the liver. Calcifications in the lymph glands, calcifications in the liver and spleen, calcifications in the aorta, gall-stones, renal calculi are all distinguishable directly or indirectly by supplementary studies with cholecystography, pyelography, and such other special technics.

7. Suprarenal calcification may be mistaken, but this tends to be quite discrete, and can be recognised by its relation to the kidney shadow, where it is seen only at the upper pole. Special technics as lateral radiography of the pancreas with air inflation of the stomach, visualisation

of the pancreas after induction of artificial pneumoperitoneum or the retroperitoneal injection of air or oxygen, or visualisation of the duct system of the pancreas by retrograde filling during duodenoscopy are not necessary in case of pancreatic calculi.

8. Enteroliths and pseudoenteroliths particularly in children should be excluded. Of course here the diagnosis is settled by the child passing large intestinal calculi in stools.

Case No. 1.—H. M., aged 21, was admitted for pain in the abdomen in the right hypochondrium. A year back he was operated for pain in the right loin, but no relief. There is no statement regarding operation, what was done or what was found. He had pain for the last few months continuously in the right hypochondrium. Family history of pulmonary tuberculosis in father and brother. Chest showed clinically deficient air entry in both apices, but X-ray showed no evidence of pulmonary tuberculosis. Liver was slightly plus, spleen could not be felt. There was tenderness in the right hypochondriac region.

Laboratory tests:—Blood:—Blood sugar—100 mg. % (normal 70–100 Mg.)

R.B.Cs.	4,420,000
Hgb.	82 %
Colour index	0.83
Total W.B.Cs.	9200



FIG. 1.—Carcinoma of the head of the pancreas.
(Wide page 8, Case No. 1).

Differential count:—

Neutrophiles	74 %
Eosinophiles	0 %
Basophiles	0 %
Monocytes	2 %
Lymphocytes	24 %

No malarial parasites.

Stool examination:—Ova and cysts nil.

Urine:—Albumin and sugar absent.

Urine diastase index S. N. 8-32.

Phosphatic crystals and epithelial cells.

Fasting gastric juice:—Quantity 12 c.c. Bile and blood absent.

Mucous present. Starch absent. Occult blood test—negative.

Microscopic examination:
A few epithelial cells.

No R.B.Cs. or pus cells.

X-ray examinations.—

1. Plain abdomen:—Fig. 2 & 3 show multiple calculi on the right side in the main Duct of Wirsung and its ductules about the level of 1st and 3rd lumbar vertebrae, extending across the spine and lying to the left of the spine at the level of 12th dorsal vertebrae. This plate shows the calculi in the tail of the pancreas as high as 12th dorsal vertebra.

The calculi vary in size, most are minute, some in the tail are large. They are irregular in shape. They are very dense. They are lying in groups close to the spine. Fig. 3 the lateral view shows the calculi

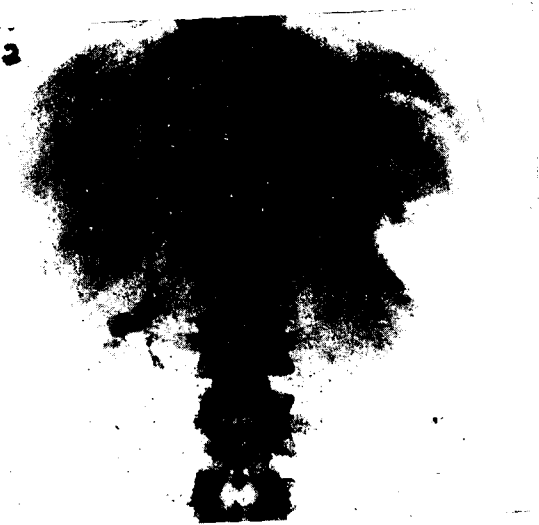


FIG. 2.—Plain abdomen.



Fig. 3.—Plain Abdomen. Lateral view.

posteriorly placed just anterior to the spine from 12th dorsal to the 3rd lumbar vertebra.

Barium meal examination of the stomach and duodenum.

Fig. 4 shows the stomach normal in position and features. The duodenal curve is much enlarged, is longer, and extends about 3 inches to the right of the lumbar spine. The descending duodenum is more tubular, the characteristic valvulae conniventes are not well marked. They are almost absent in the proximal two thirds of the descending duodenum, but are well marked in the horizontal part of the duodenum. The pancreatic calculi are well visible within the

duodenal arc. On the left side they are seen above the lesser curve and medial to it.

Cholecystography: Fig. 5, (vide page 11) resting phase 15 hours after the contrast dye, shows gall-bladder normally visualised, lies about one inch above the pancreatic calculi in the head of the pancreas.

Pyelograms: Fig. 6 and 7 (vide page 11) show the overlapping shadows of the pancreatic calculi in the head of the pancreas and the calyces and pelvis of the right kidney. This shows very well the relation of the right kidney to the pancreas. On the left side the calculi lie well above the highest cephalic calyx. The kidneys show normal pyelograms.



Fig. 4.—After Barium Meal.



Fig. 5.—Cholecystogram.



Fig. 6.—Pyelogram.



Fig. 7.—Pyelogram.

Fig. 8.—Case 2.—Plain Abdomen.
(Vide page 12—Case No. 2)

Case No. 2.—B. H., patient gave history of severe abdominal colic—pain in the right hypochondrium—repeated attacks of biliary colic. Patient, a confirmed diabetic—high percent of sugar in the urine in the past. She takes insulin twice monthly now. Urine shows no sugar now. Patient is also markedly asthmatic. No history of jaundice. Patient was referred for gall-bladder investigation. A plain plate of the gall-bladder was taken which shows no gall-stones, but the film shows fine opacities extending from the right side to the left side of the spine, very suspicious of commencing pancreatic calculi. Unfortunately patient refused all further investigations.

Case No. 3.—A case of pancreatic calculi was spotted from old films. Fig. 9.



FIG. 9. Case 3.—Plain Abdomen.



FIG. 10. Case 4.—After Barium Meal.

Case No. 4.—Loaned by Dr. K. P. Mody of the Tata Memorial Hospital. Patient, a male, aged 29, a heavy alcoholic, complained of pain in the epigastrium and left hypochondrium for the last 3 to 4 years, now complaining of pain for the last 3 months more or less continuously. Physical examination shows no lump in the abdomen. Chest on screening shows nothing abnormal. No sugar was found in the urine, blood-sugar was 95.2 mg.%. The X-rays taken after barium meal show multiple pancreatic calculi lying within the duodenal curve. (Fig. 10 & 11). The interesting points are that some of the calculi are faceted, and that they are not visible in the head of the pancreas

to the right of the spine, which is the favourite site of the calculi, but they are mainly visible overlying the spine. There are a few just below the stomach. Another interesting point is that the case is complicated by a pancreatic cyst. The X-ray reveals beside the calculi, displacement of the stomach upwards and to the left, expansion of the duodenal curve, a diminution in the calibre of the duodenum, and there is slight pressure also over the greater curvature of the stomach. In view of the presence of the pancreatic cyst, which is most probably a retention cyst, the question arises whether these are really pan-

creatic calculi, especially as they are absent in the favourite site in the head of pancreas, or whether they are calcium deposits in a pancreatic cyst. The fact, however, that they lie in groups close to the spine, and that some of the opacities are faceted, are in favour of pancreatic calculi.

The occurrence of pancreatic calculi and the cyst in the pancreas of

this patient raises the question, whether the pancreatic calculi could have given rise to the pancreatic cyst or whether the association of stones and cyst in this case should be considered as coincidental. This is a question for the clinician and the pathologist. The general clinical impression is, however, that cysts are not infrequent sequelae of duct obstruction due to

stones, but it may well be that there may be some initial pathological disturbance of the pancreas, and this may be a common precursor of both pancreatic calculi and cyst.

CRILE & JAFFE report a case of pancreatic calculi causing intestinal haemorrhage. He had pain in the

upper abdomen for 18 months. The pain was not related to meals, did not radiate and was only occasionally associated with vomiting. He had two massive haemorrhages from the gastro-intestinal tract with vomiting of blood and melaena. Blood sugar was 130 mgs. per cent.

X-ray showed a spherical shadow, radio-opaque, at the level of the 1st



FIG. 11. Case 4.—After Barium Meal—Oblique view.

lumbar vertebra on the right side, which was interpreted as a pancreatic calculus. Barium meal investigation showed a normal stomach and duodenum. But there was a constant semilunar filling defect on the right of the duodenum proximal to the junction of its second and third portions. It was smooth in outline, except for a small ulcer crater in its upper aspect.

The patient was operated upon, and at operation, thickening of the second part of the duodenal wall was found. The entire pancreas was swollen and tense, and the head of the pancreas was hard and enlarged to about twice the normal size. About 1.5 cms. lateral to the ampulla of Vater was a punched-out, chronic peptic ulcer penetrating all coats of the bowel except the serosa. After the ulcer was excised, a fistulous tract was found extending medially from the ulcer site. A probe inserted in this tract showed pancreatic calculi, which were removed.

X ray taken weeks after operation showed incomplete filling of the right side of the 2nd part of the duodenum corresponding to the site of the excised ulcer and a small streak of barium entered the pancreatic duct.

The chronic ulcer and the appearance of the tract leading to the stones made it appear that this tract was a fistula arising from the pancreatic calculi and extending to the duode-

num, where it was converted into a chronic peptic ulcer by the action of the digestive juices. Erosion of a blood vessel was responsible for the massive haemorrhages, both vomiting of blood and melaena.

The above interesting case quoted from *Radiology* (46: 586-589, June 1946) adds one more complication to the complications of pancreatic calculi already mentioned, namely, gallstones, diabetes, steatorrhea, pancreatic cyst.

RIENHOFF and BAKER describe an interesting case of pancreatic calculi from the therapeutic point of view. Patient had severe pain in the epigastrium which came on after meals, and was accentuated by taking food. Because of the severity of pain, the patient sought relief by drinking whisky. He had severe diabetes mellitus. Blood sugar showed 200 mgs. per one hundred cubic centimeters. X-rays showed calculi in the head and tail of the pancreas.

The patient was operated upon, pancreas was exposed, and the incision was made in the line of the Duct of Wirsung. Pancreas was found to be hard and gritty with areas of calcification. A big stone from the pancreatic duct was removed, the duct was ligatured, and a portion of the body of the pancreas was removed. There was no amelioration of signs and symptoms.

Patient began again to drink hard, diabetes increased, and he became in addition a morphine addict. His stools were now voluminous and fatty.

Patient was again operated on, and a transthoracic vagectomy and sympathectomy were performed, at which time, the sympathetic trunk from the 5th thoracic to 2nd lumbar ganglion was removed transthoracically. The right and left vagus nerves were also resected above the diaphragm for a distance of 3 cms.

The patient was tremendously improved, and was entirely free of pain, for the past 6 months.

The history of alcoholism in Case No. 4 and in Rienhoff and Baker's case merely points to a self imposed habit to combat the excruciating pain of the disease.

CONCLUSIONS: Radiology has thus come to play an important part even in the recognition of pancreatic diseases. One cannot too strongly emphasise the necessity of looking for evidence of such disease in all obscure cases with upper abdominal symptoms, particularly when there are (1) vague attacks of abdominal pain, (2) diarrhoea with fatty stools, (3) enlargement of the liver, (4) jaundice of uncertain origin, and (5) diabetes. The possibility of pancreatic calculi should not be overlooked when the pain is typical in location

and radiation. Because of the awareness of pancreatic disease and improved X ray technics, the diagnosis of pancreatic lithiasis is now made more frequently than heretofore.

SUMMARY.—(1) 4 cases of pancreatic calculi diagnosed by X-ray investigation alone are described.

(2) The clinical signs and symptoms and laboratory tests described are vague and in no way helpful.

(3) The radiological characteristics of pancreatic calculi are discussed.

(4) The X-ray investigation offers the best method of pre-operative diagnosis.

(5) Location is a very important factor in making a diagnosis, the calculi lying in a plane between the 12th dorsal and the 1st lumbar. The high position of the tail of pancreas in the hypochondrium should be remembered.

(6) Lateral views and stereoscopic films should be taken in addition to the A.P. view to help the differential diagnosis.

(7) In establishing the relationship of suspected shadows in the pancreas, the gallbladder, duodenum and the kidneys should be visualised.

(8) Pancreatic lithiasis occurs in 2 types—the true calculi in the ducts, and the pseudo-calculi or calcifications in the parenchyma.

(9) Two cases are quoted from the literature, one case reporting gastro-intestinal haemorrhage, and the other reporting alleviation of pain of pancreatic calculi and pancreatitis by a transthoracic vagectomy and sympathectomy.

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Close Range Low Voltage X-Ray Therapy Chaoul (Contact) Therapy

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IN the year 1932, at the Radiological Congress at Dresden, Prof. H. CHAUL of the Charité Hospital, Berlin, first reported his experience with what is now known as Contact Therapy or Chaoul Therapy. This, in reality is short distance low voltage Roentgen Therapy, or Close Range Low Voltage X-ray Therapy, undertaken with what is known as the Chaoul Tube. Since, then, similar Close Range irradiation has been utilised by almost similar apparatus, but with different technical factors. Our experience has been limited exclusively to Chaoul's apparatus which was installed in our Institution early in the year 1936.

This method of irradiation arose from the appreciation of the fact, that the apparent superiority of radium over Roentgen Therapy was

not based on the actual quality of the rays, but solely on the physical and technical methods of application i.e., the effect of radiant energy depended not upon the selective action of any particular wave length but only on the total energy absorbed per cubic centimeter of the tissues and the time interval, viz., fractionization of total energy. This idea at the time had been confirmed by a number of investigators among whom may be mentioned HOLTHUSEN, BRAUN, HAMANN and ENGLEMANN. HOLTHUSEN had observed that there was neither qualitative nor quantitative differences in either erythema or epilation, between the effects of irradiation on the skin, with gamma rays on the one hand, and low voltage X-rays on the other. ENGLEMANN also noted in like manner no difference in

morphological changes in the tumour cells when they were subjected to similar rays.

The principles of the new method are (1) short distance between the target and the skin, (2) low voltage, 55 k.v. to 60 k.v., (3) superficial action with absence of deeper penetration, (4) limitation and localisation by applicators to protect normal surrounding tissues, (5) fractional dosage, and (6) great concentration with increasing absorption per c.c. of tissue. All these are incorporated in a shock proof monopolar X-ray tube of unusual design in which the electron beam passes through a hollow metal cylinder which is grounded. The beam impinges against a window situated at the end of the cylinder. The window which serves as a target is made of thin copper sheeting of 0.2 mm. thickness and which forms part of the inherent filtration. In addition, the rays pass through a thin sheet of cooling water in front and a 0.2 mm. thick aluminium foil, which is part of the cooling jacket, situated in front of the target. The output of the tube amounts to 150-200r per minute. The half value layer of the emerging beam is 0.13 mm. of copper and the effective wave length is about 0.32 Å. The unit is supplied

with detachable applicators of 5 cm. and 3 cm. in lengths respectively. These are shaped either round or oval with different diameters, thus enabling the radiation to be given to growths of any size or contour. The applicators are usually covered over with thin rubber or latex thimbles during treatment.

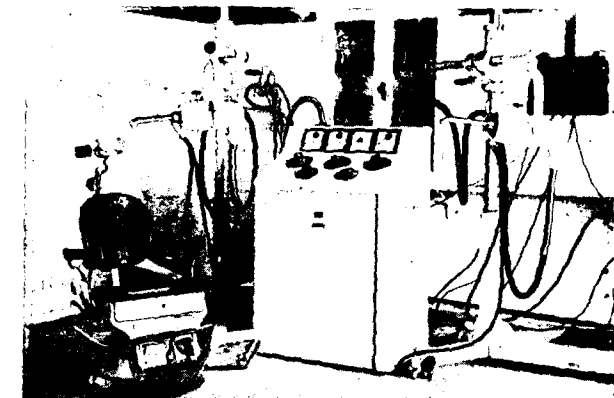


FIG. 1.
Chaoul's Contact Therapy Apparatus.

The reduction of target skin distance permits the delivery of a very high 'r' per minute and allows the energy within the treated area to reduce quickly, both in depth as well as on the sides, thereby permitting the administration of high lethal doses at the centre of the pathological lesion, without proving detrimental to the surrounding healthy tissues. This is very important as the treatment spares the reactive matrix which is necessary for healing and to preserve the defensive elements in it. This is in accord with the axiom of

successful radiation therapy, wherein maximum destruction of the tumour cells and the minimum injury to the adjoining normal structure are assured.

The energy gradient or the isodose curves obtained by the Chaoul Tube are as follows:

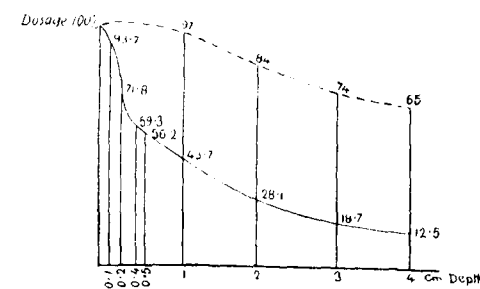


FIG. 2

Percentage depth dose (comparative curves)
(Chaoul)

F.S.D. 5 cms.; Aperture of applicator—4 cms. dia.; Field—12.56 sq. cm. 60 k.v. at 4 Ma.; Filter 0.2 mm. Cu.; H.V.L.—0.13 mm. Cu.; measured in water.

F.S.D. 30 cms.; Field 10 × 15 = 150 sq. cms.; 175 k.v. at 4 Ma.; Filter 0.5 mm. Cu.; H.V.L.—0.5 mm. AL; H.V.L. 1.0 mm. Cu.; measured in water.

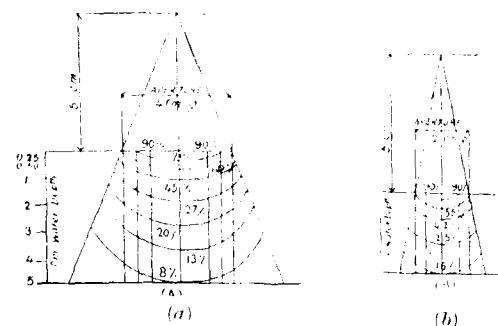


FIG. 3

- (a) Isodoses with 5 cms. F.S.D.; 60 k.v.; Filter—0.2 mm. Cu. Aperture of applicator—4 cms. dia.
(b) Isodoses with 5 cms. F.S.D.; 60 k.v.; Filter 0.2 mm. Cu. Aperture of applicator—2 cms. dia.

From these isodose curves it can be discerned that because of their depth dose, this method may be regarded as superior to most kind of radium contact applications. It is also evident that it is not advisable

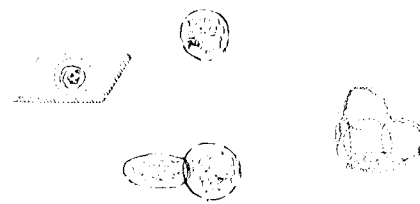


FIG. 4

Method of Applications.

to reduce the target skin distance to less than 3 cm. as the intensity distribution of the beam reduces very rapidly beyond this point. The other advantage of this therapy is that it is extremely flexible, easily manipulated and very convenient. Hence it is specially very effective in the treatment of tumours at awkward situation or of certain cavities like the oral cavity, viz., the floor of the mouth, the gingival margin, the tongue, the palate and the tonsils, etc. Intra-oral therapy with special cone is not a new procedure and you are aware of the difficulties attending such treatment with high voltage irradiation. It is difficult in the first place to localise the lesion and then to maintain it in place during treatment; and secondly it is irksome to the patients to maintain a steady position for

a necessarily longer treatment period. Besides, the adjoining structures receive simultaneously as much radiation as the tumour itself, however much you may wish to avoid it. Then, this is followed by the usual after-effects of irradiation, especially mouth dryness which becomes the source of extreme discomfort to the patients. These are not true of Chaoul Therapy; the lesion is easily localised and maintained during treatment which is very short and post irradiation effects are slight.

The technic of treatment is solely governed by the individual lesion. No two lesions in similar sites may receive the same total dose nor the same daily dose. Besides the total doses are never to be arbitrarily fixed before the beginning of the treatment. The total dose, in our opinion is governed by two factors; the size of the field and the biological reaction of the irradiated area. In very small lesion which would be covered by a single portal it is possible to give a total dosage up to 6000–9000r,



FIG. 5 (a) Before treatment.



FIG. 5 (b) After treatment.

Cancer buccal mucosa cheek with metastasis.

The unit is also very economical and the short treatment time permits the treatment of a large number of patients daily.

fractionated into 300–400r daily doses. It is also true that the larger the field irradiated, the smaller the total dosage would be. Where

multiple portals are used, as in cases of very large lesions, it is only in exceptional cases one need exceed a total dose beyond 5000 6000r to each portal and fractionated into 300r daily. The continuation or cessation of treatment is dependent upon the reaction of either the skin or the mucous membrane.

Single massive dose technic at weekly intervals, we gave up early due to two definite reasons; first, the failure on the part of the patient to return, secondly, our observation that the regression of the tumour

been to obtain a complete disappearance of the tumour in the very first course of therapy. Where it is not possible, due to reaction, we generally wait for about three to four weeks before giving a second course to the residual lesion, the total dosage of which necessarily would be much smaller than in the former.

In the treatment of lesions less than 0.5 cm. in diameter, perforated lead rubber shields are used and in such cases very high total dosage may be given with impunity. Where the lesion is such as to be covered



FIG. 6 (a) Before treatment.

Cancer cheek with metastasis.



FIG. 6 (b) After treatment.

was not as rapid or complete as when the fractionated method was employed. Our aim up to now, has

by a single portal, only such an applicator which will enclose a narrow margin of normal tissue around

it, should be selected. When there are very large lesions, multiple portals are used taking care to include a thin margin of normal tissue in the periphery. In such cases overlapping of portals (is inevitable; but overlapping of more than two portals) on any given area should be carefully avoided for obvious reasons. It is seldom necessary in our experience, to use more than four portals at the most, in any lesion except in recurrent carcinoma of the breast where the problem is entirely different.

In carcinoma involving the entire thickness of the cheek or the lip, we have found it advantageous to

surface on the outside are treated alternately with daily doses of 300—350r.

The tumour begins to regress as a rule, during the treatment when fractionated method is used. If a rapid retrogression is noted early, after about 4000r has been administered, it is better to stop the treatment and watch. Usually, a complete disappearance of the tumour occurs within a few days. If not, treatment may be resumed to completion.

The reactions seen in Chaoul therapy differs very little from those seen after routine Roentgen therapy. Earliest reaction seen on the skin is erythema, which may vary from a



FIG. 7 (a) Before treatment.

Cancer skin suprasternal notch.



FIG. 7 (b) After treatment.

use the cross-fire technic. The buccal simple transient erythema to a progressive one. When the total dose surface on the inside and the skin

does not exceed 4000r or so, the erythema is followed by dry desquamation (desquamative epidermite) which consists of very thin scaling of the dermis with bronzing. With doses ranging between 4000—6000r an exudative reaction (exudative epidermite) occurs characterised by a denudation of the superficial layer of the dermis, covered over by a thin film of fibrin. With doses reaching

enantherma which gradually progresses to radio-epithelitis (Coutard). A whitish or grey, glossy or glistening membrane covers the irradiated area when a total dosage of about 5000r is administered. It also displays an intensely granulating surface. Radio-epithelitis disappears in about three to four weeks. In all properly treated cases, healing of the reaction is attended with formation



FIG. 8 (a) Before treatment.



FIG. 8 (b) After treatment.

Cancer upper and lower lips

up to 7000r or so, thick incrustation covers the denuded area. The reaction subsides and the re-epidermisation of the area occurs, which is complete in three to four weeks. In the case of mucous membrane the initial reaction is seen as an early

of normally appearing skin and mucous membrane; and where high doses have been administered, the irradiated areas may show pale soft atrophic scars. Because of very satisfactory cosmetic results, contact therapy is especially indicated in lesions of the face.

CHAOUL was of opinion, that contact therapy was contra-indicated, if the tissues were already once irradiated with either Roentgen rays or Radium or by both according to the conventional methods. He was also opposed to any simultaneous combination of contact therapy with the conventional methods of X-ray therapy. We, however, differ from him on both accounts. We have observed on the contrary, that it is advantageous in certain cases to use contact therapy with Roentgen therapy, e.g., in carcinoma of the

more often after, to the primary tumour with success. However, it must be conceded that it is not advisable to give further contact therapy or any form of irradiation to tissues already devitalised by previous irradiation as it will necessarily result in necrosis or other complications.

Even though we had attempted in the beginning, Chaoul therapy for the treatment of metastatic lymph nodes, we gave up the practice as it is much simpler to control the disease here, by higher voltage

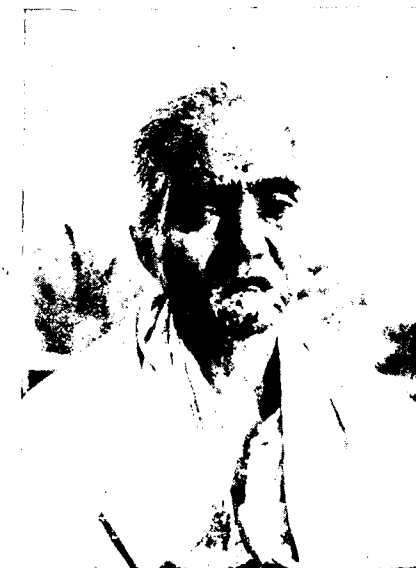


FIG. 9 (a) Before treatment.



FIG. 9 (b) After treatment.

Cancer lower lips.

tonsils with metastasis, we invariably use Coutard's method of irradiation combining it with Chaoul therapy either simultaneously or

irradiation or by interstitial radium.

Following Chaoul, we did try the contact therapy in a few cases of carcinoma cervix introducing the

tube into the vagina; but soon discarded, it, as the patients were not very co-operative, in the first place and secondly, as the localisation of the lesion confined to the cervix was found rather difficult. However, we feel that it is worth a further trial especially in the proliferative growths of the cervix, where necrotic bleeding is often encountered.

There is no doubt that all accessible tumours including those in natural cavities can be successfully irradiated with Chaoul tube; besides it is also possible to irradiate with it certain deep seated tumours like those situated in the bladder and rectum, and which can be made accessible by operative intervention.

The material hitherto irradiated consists of carcinoma of the skin, buccal mucosa, tongue, lips, parotid glands and local carcinoma of breasts etc., as well as certain non-malignant conditions such as angiomata, keloids and rhinoscleroma, and some inflammatory conditions. We must specially

mention, angiomata where we had consistently very good results. (This will form the subject matter for another paper.) As a matter of fact we consider Chaoul therapy as the most ideal for this condition. Keloids respond very well to Chaoul therapy if they are not very extensive, when, higher voltage therapy can be advantageously substituted. Rhinoscleromata when they are early, yield to Chaoul therapy. Among the inflammatory conditions which subside after contact therapy are included boils, carbuncles, furuncles, small abscesses and warts and mycotic infections. On the whole, confining our reports to cases treated with Chaoul therapy only, we cannot but feel justified in regarding this method as equivalent to Radium therapy, if not superior.

The following are two statistical tables of cases treated only with Chaoul therapy and the results speak for themselves.

TABLE 1.
Proved carcinoma of the skin and melanoma.

Site of primary lesions.	Total No. of cases.	With Metastasis.	Free from Primary Signs.	Follow up Living and well up to				
				1 Yr.	2 Yrs.	3 Yrs.	4 Yrs.	5 Yrs. & over.
Cheek	10	4	7	1	—	4	3	5
Nose	5	—	5	—	—	1	3	3
Ear	7	1	6	2	4	—	4	—
Eye	4	—	3	2	2	2	2	2
Rest of face	17	2	15	8	—	3	7	—
Trunk and extremities	18	2	14	1	1	6	6	4
Melanoma	4	1	3	2	—	1	2	2

TABLE 2.
Proved carcinoma of the lips, oral cavity and glandular organs.

Site of primary lesions.	Total No. of cases.	With Metastasis.	Free from Primary Signs.	Follow up Living and well up to				
				1 Yr.	2 Yrs.	3 Yrs.	4 Yrs.	5 Yrs. & over.
Upper lip	4	—	3	1	1	—	—	—
Lower lip	19	4	15	7	2	3	—	9
Tongue	15	5	10	2	—	9	—	5
Tonsils	5	2	4	4	3	—	2	2
Buccal Mucosa	18	5	12	10	4	7	5	5
Floor of the mouth	5	1	4	3	1	3	—	2
Parotid gland	2	—	2	2	2	2	—	—
Breast	5	—	5	1	—	3	1	2

Summary.—Chaoul tube for close range irradiation has been described.

The method of application, the technic of treatment and the use of single, multiple portals as well as the cross fire technic in the treatment of malignant conditions have been discussed.

On account of the rapid absorption by the tissues of the radiant energy, the advantages as well as the limitation of the method are presented.

Contact therapy is an economical and a highly efficient method of treat-

ment of almost all superficial malignancies, benign conditions and certain inflammatory conditions.

A statistics of treated cases is also appended.

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Radiological Measurement of the Aorta

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THIS report on investigations which I present have been made in the Institute of Radiology of University of Ferrara, by Prof. MARIO LENZI, Director and his scholars.

These are based on new principles for the radiological measurement of the aorta, suggested by Prof. M. LENZI and applied in normal subjects, in young tuberculous, and in old aged subjects.

New Principles for the Radiological Measurement of the Aorta by M. LENZI (Director of the Institute of Radiology—University of Ferrara), *La Radiologia Medica*, 1946, Vol. XXXII, No. 7, page 255.

This procedure is based on the old geometrical corollary proving that if three points are taken in a plane surface one sole circumference passes through them and its centre is corresponding to the crossing point of the axis risen on the straight lines joining successively such points.

Therefore by drawing three points at one's choice on a circular arc it is possible to reconstruct the circumference to which such arc belongs and consequently, to measure its diameter, which is an interesting detail

to the purpose of measurement. (Fig. 1).

Such a procedure was first studied by LINS and subsequently by LIANE MARCHAL, who used it with a view to

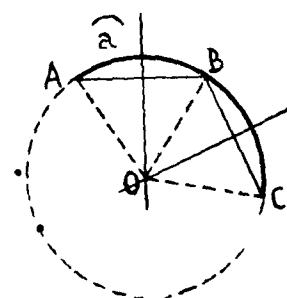


FIG. 1.
2 AO }
2 BO } Diameter.
2 CO }

measure the diameter of the aorta in correspondence with to its arc, availing themselves of that portion of the aortic knee that is visible through the sagittal projection and that juts out from the left side of the sterno-mediastino-vertebral opacity, giving rise to the so-called "aortal button." (Fig. 2 vide page 27).

The author has completed the research carried out on sagittal projection, angle of incidence P. A. (postero-anterior), with the one on the right anterior oblique projection. In such posture the portion of the upward (ascendens) aorta is placed above the downward (descendens) aorta—for this, it is sufficient to make

the subject rotate about 15° to 20° rightwards. Thus one, obtains a ribbon-like image, on top of which it

mediastinical development. This measurement is calculated, being the subject on a "forced" oblique left fore projection. The "optimum" posture is the one showing the aortic arch reaching its largest width. (Fig. 5 and 6 vide page 28).

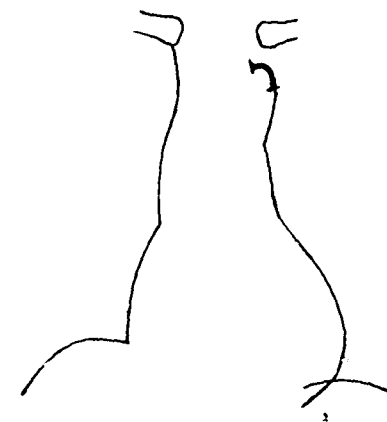


FIG. 2

appears as a semicircle formed by the upper edge of the aorta deflecting leftwards and backwards with different obliquity. (Fig. 3 & Fig. 4).

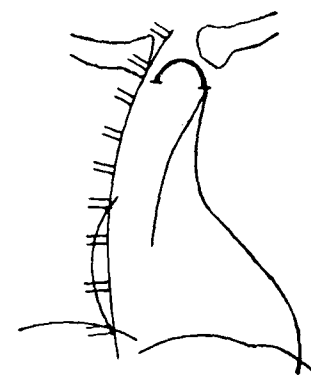


FIG. 3

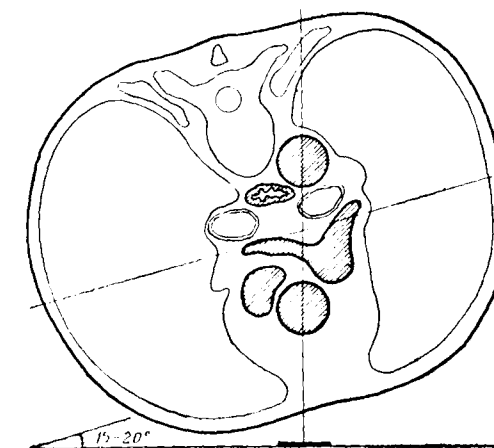


FIG. 4

Further the author has introduced a third measurement; that is, the measurement of the aortic arch in its

The reliefs of the three points on the outline of the "aortic button" (for the 1st measurement—Fig. 2),

of the "aortic hood" (for the 2nd measurement Fig. 3), and of the "aortic arch" (for the 3rd measurement Fig. 5), have been always carried out during the systolic phase of the vessel, the subject being in the position of apnea (in the middle way between the inspiration and the expiration movements).

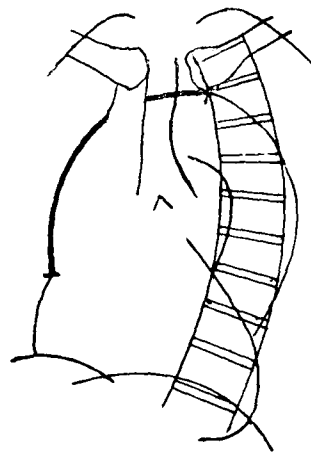


FIG. 5

As a general rule, the relief of the three points, for each measurement, on the respective arcs of circumference, is to be carried out through orthodiagraphic process. However, it may be replaced by a non-orthodiagraphic relief, the latter being quicker and easier to be taken. The author has, in fact, followed this way, taking the reliefs at a standard distance of about 32 inches, with an anticathode fluorescent screen, the subject being close to the screen with

his thoracic wall. On further experiments being made in order to calculate the percentage of enlargement of the image of the aorta projected on the fluorescent screen, we came to the conclusion that the correction percentage for both the figures of the 1st and of the 2nd measurements are to be given as 10%, and the figures of

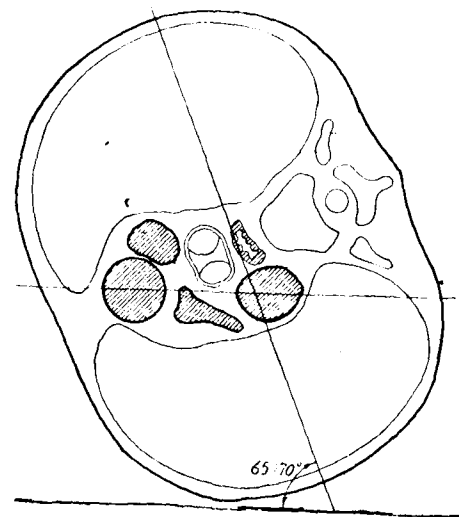


FIG. 6

the third measurement 15% (always with a focal distance of about 32 inches.)

Finally, the author has also carried out aortometrical reliefs on 70 subjects of different sex, in normal condition, fairly homogeneous with regard to their weight and height and of different ages, inasmuch as it varied from 20 to 60 years. The chosen subjects had a normal thoracic conformation.

TABLE I.

	Ma	Ms	θ	Extreme individual values		V (+)
				Mx	Mn	
Aortic diameter (Aortic knee) (1 and 2nd measurement).	cm. 2.85	cm. 2.9—3 mm. $\pm$ 0.14 (*)	$\pm$ 1.68	cm. 3.35	2.35	56
Great aortic diameter (3rd measurement).	cm. 12.8	cm. 12.5—12.9 $\pm$ 0.13 (*)	cm. $\pm$ 1.59	cm. 14.7	cm. 10.5	12
Height	m. 1.64	m. 1.64—1.67	cm. $\pm$ 1.81	cm. 1.84	m. 1.48	11
Weight	kg. 57.2	kg. 57—60	kg. $\pm$ 1.84	kg. 75	kg. 42	3

Ma—Arithmetical Mean. Ms—Serial mean. θ —Sigma.

Mx-Mn—Extreme individual values, maximum and minimum values respectively, come upon through each measurement.

V—Co-efficient of variation.

*—Possible mistake in the serial mean— $\pm 0.6745 \frac{\sigma}{\sqrt{n}}$ where n represents the number of patients considered.

†—Coefficient of variation (V)— $\frac{\sigma}{Ms} \times 100$.

TABLE II.

	Ma	Ms	θ
Diameter of the aortic knee	cm. 2.57	cm. 2.6—2.7	$\pm$ mm. 1.68
Great aortic arch diameter	cm. 10.88	cm. 10.63—10.97	$\pm$ mm. 1.59

The first table contains all the data, the percentage of which has not yet been amended; in the second table on the contrary are collected the figures in which the percentage mistake, due to the author's relieving process, has already been amended. The real and definite measurements of the examined diameters are therefore evidenced by these figures.

"Aortametry carried out on young tuberculous subjects"—A. Govoni, M.D., *Annali di Radiologia Diagnostica*, 1947, Vol XIX, No. 1, page 52.

The author has measured the diameter of the aortic calibre at the level of the "knee" and the diameter of the large aortic arch on 100 individuals (50 women and 50 men), suffering from pulmonary tuberculosis, of about the same age,

height and weight; the author has used the same process as Lenzi-Pinotti.

The aforesaid 100 individuals had previously been divided into two different groups according to the evolution of the tubercular manifestation:—subjects afflicted mostly by forms of chronic productive phthisis and subjects afflicted mostly by exudative tuberculosis. The conclusions derived by the author from the comparison between the aortometrical figures obtained on tuberculous subjects and those from individuals enjoying a good health (Lenzi-Pinotti), would strengthen the opinion of an aorta having inferior dimensions in individuals suffering from pulmonary tuberculosis of chronic productive types; further, from

fixing the index of correlation, the following elements have turned out to be connected to one another in both the groups of individuals taken into consideration: aortic calibre and large aortic arch; aortic calibre and height; large aortic arch and height.

“Aortometry carried out in old aged subjects”—Magri G., M.D., *La Radiologica Medica*, 1947, Vol. XXXIII, No. 7, page 358.

In 70 subjects over the age of 60 the author measured radiologically the calibre of the aorta and the diameter of the aortical arch extracting average values, that he considers physiological in old age.

Radiotherapy of Metropathias

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THE term “Metropathia Haemorrhagica” referred to also as “functional uterine haemorrhages” excludes uterine bleedings caused by malignancy, fibroids and inflammatory conditions, also constitutional diseases like hyperthyroidism, leukaemia and purpura. It is not the purpose of this paper to go into details of the etiology and diagnosis, or therapeutic procedures adopted other than Radium and deep X-ray therapy. I would only mention that a diagnostic curettage will help excluding malignancy of the corpus

uterii, and if glandular hyperplasia of the endometrium is confirmed, helps selection of Radium application as a therapeutic measure, in preference to external deep X-ray therapy.

For purposes of treatment, I classify the cases into three distinct age groups:

Haemorrhages of puberty age 14 & 15
During the child-bearing age 20 to 40
Approaching menopause 40 to 50

Though in India a mother may be as young as 15 years, I have classified 20 to 40 as “child-bearing age.”

as none in the series who came with metropathia were between the ages of 15 and 20.

In physiology, we are told that the endometrium responds to stimulation from the ovary, the hormones of which cause it to proliferate and secrete. Behind the ovary is another force, the anterior lobe of the pituitary; and then the thyroid influence. The ovarian function is most likely to be disturbed during puberty and menopause, and produce irregular or profuse bleeding. It is not yet definitely clear why such haemorrhages should occur during the child-bearing age, when in the absence of pathological or inflammatory conditions menstruation should be normal and regular.

Repeated curettage and prolonged hormone therapy have been adopted, but not with uniform results and ultimately hysterectomy has been resorted to in order to save the life of the patient. WILLIAMS reporting on statistics collected of over 50,000-irradiated cases from well-equipped clinics in U.S.A., England, Germany and France (*Radiology*, March, 1936, p. 317 “Fibroids and Abnormal Uterine Haemorrhages”) gives an average cure of 90%. Though his figures include cases of fibroids, identical or better results might be expected in cases of functional haemorrhages.

At the Third Obstetrics and Gynaecological Congress at Calcutta in 1941, I made a report on 67 cases of benign uterine haemorrhages (including fibroids) treated during five years prior to 1940 and followed up. Out of these only two had to be submitted to hysterectomy on account of severity of haemorrhage. All others responded favourably. I give below figures of only the cases of metropathias treated in my private clinic during the five-year period 1941-1945 inclusive:

Haemorrhages of puberty	4 cases
Child-bearing age (majority between 35 and 40 years)	37 ..
Approaching Menopause...	51 ..
Total ...	92 ..

Out of the 67 cases reported in 1941, one case was haemorrhage of puberty; 32 cases of other two age groups (20 to 50 years) were metropathias, making the total number of metropathias treated during the ten year period 125.

When a diagnosis of endometrial hyperplasia is established, intra-uterine Radium may be preferred. In the absence of such a condition, external deep X-ray therapy should be given to lessen the ovarian activity and there is also brought about shrinkage of endometrium, due to the endarteritis obliterans produced by the radiation.

In cases of haemorrhages of puberty, the ovaries are not irradiated. The

pituitary and the thyroid are irradiated with deep X-rays, as also the spleen, as the latter procedure is considered to throw more fibrin into circulation and increase coagulability of the blood. We had four cases since 1941 (age 14 to 15 years) all of whom responded favourably and with one course of treatment.

Technique:—Pituitary—180 k.v. $\frac{1}{2}$ mm. Cu. + 1 mm. Al. filter, 5 cm. round temporal ports (one right and other left) depth dose of 200r in 2 exposures.

Thyroid—140 k.v. $\frac{1}{4}$ mm. cu. + 1 mm. Al. filter—200r in two exposures of 200r each (air dose).

Spleen—180 k.v. $\frac{1}{2}$ mm. Cu. + 1 mm. Al. filter 400r in two exposures of 200r each (air dose).

X-rays in whatever dose is always destructive, and the view that small doses are stimulative, I believe, is erroneous. The small doses as employed in irradiation of pituitary and thyroid in haemorrhages of puberty, are inhibitive in effect.

During child-bearing age a temporary amenorrhoea dose of deep X-rays is given to uterus and ovaries in preference to radium, as on account of local caustic effect and sloughing that would result from radium, the cervix might cicatrise, and the rigidity so caused, may be a complication in subsequent pregnancies.

Some believe that ovaries may be permanently damaged by deep X-rays depleting the system from the necessary balance of ovarian hormone. I wish to emphasise that there is no foundation for such a conception. Particularly during child-bearing age, ovaries are very active and recuperate rapidly from effects of radiation. I submit personal experiences from my clinic.

1. Cases of cancer cervix that have been treated with Radium and deep X-rays—ages 20 to 50 and above have remained well for periods of 5 to 10 or more years without disability or breakdown of health due to the sterilising dose of radiation, the ovaries had to receive

2. Since 1937, I have as a routine, given sterilising dose of deep X-rays to ovaries in all cases of cancer of the breast referred to me for post-operative radiation, and have not received reports of unusual complaints due to the resulting artificial or premature menopause.

3. Four cases of metropathias of "child-bearing age" treated by temporary amenorrhoea dose of external deep X-rays. after a period of 8 months to $1\frac{1}{2}$ years of amenorrhoea started menstruating irregularly first, later on regularly, conceived and confined normally in due course—all babies developing normally, except one, which was born with squint in

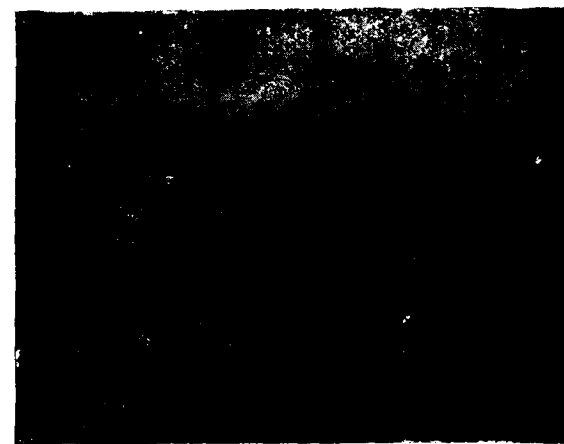


FIG. 1.
Hysterosalpingograph showing relative positions of uterus and appendages in the pelvic cavity; lipiodol in drops at the fenestrated ends of the Fallopian tubes will be the position of the ovaries.

one eye. One case (25 years old) of multiple myoma uterii, where myomectomy was done and later referred to me for irradiation as bleeding was still profuse, X-ray castration produced temporary amenorrhoea and the endarteritis in the blood-vessels shrank the remaining myomata. Three years later, she began menstruating, conceived, and a normal baby was delivered by caesarian section at full term. Mother died of complications and the baby is well and normal (irradiated in 1940, and the baby was delivered in 1945).

I only desire to point out that no undue alarm of the damaging effects of radia-

tion on ovaries is justified. Patients coming to my clinic being of a particular social standard may be depended upon to intelligently discuss and mention any disturbing symptoms. Ovaries rapidly recover from effects of irradiation.

When intracavitary radium is applied, it is not usually necessary to give more than 1,200 mgm. hours, though sometimes, as much as, 1,800 or 2,400 mgm. hours are given—the lower dosage during childbearing age, and

the higher dosage when approaching menopause. A very small quantity of radiation from radium reaches the ovaries, as it reduces in intensity in proportion to distance from

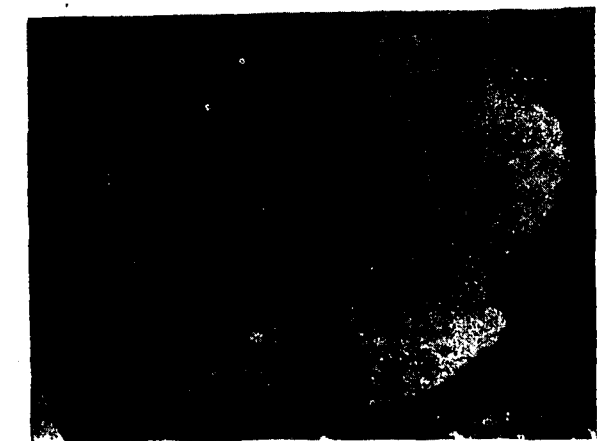


FIG. 2.
Radiograph taken after set up of patient for treatment with 400 k.v. 5 mm. Cu. + 1 mm. Al. Filter, 50 cm. F.S.D. 12 x 15 cm. hypogastric field showing the beam cover the uterus and ovaries.

source, "by the inverse square law," if at a distance of 1 cm. from the source, radiation is 100%, at 2 cm. it becomes 23.5%, at 3 cm. it is 9.2%, at 4 cm. it is 5.5%, at 5 cm. 4%, and at 6 cm. it is only 2%. So, when ovarian hyperfunction is present external deep X-ray therapy is indicated.

In employing deep X-ray therapy it is necessary to deliver to the ovaries (mid-pelvic plane) a depth dose of 300r to 400r during child-bearing age, and in cases approaching menopause, 600r to bring about a permanent menopause. This is achieved by radiating through an anterior hypogastric field (say 12 x 15 cm.) which should include uterus and ovaries. We use 400 k.v. but a modified technique with 200 k.v. can be adopted.

I shall refrain from going into the complicated physical data for depth dose calculations, and the several advantages of using the higher voltage of 400 k.v. and heavier filter. The daily dose and the number of exposures required depend on the thickness of anterior abdominal wall and fat. All immediate radiation reactions and X-ray sickness can be controlled. Though at one time there was a hesitant attitude that

blood condition should be improved before radiation therapy is instituted, experience has shown that, that view is not justified. We all know of daily maximum dose of radiation and methods of counteracting injurious effects of radiation to the haemopoietic system by giving liver extract and iron. X-ray sickness is minimised by injection of 50 to 100 mgm. of Vitamin B daily, and the use of the higher voltage of 400 k.v., which also does not produce the diarrhoea that frequently occurs with the use of 180 or 200 k.v. Occasionally a blood transfusion may be necessary in some of the cases.

Summary.—Of the total of 125 cases of Metropathias treated by radiation during ten years, we had no occasion to break treatment on account of deleterious effects of radiation; two cases of the 1935-1940 group had to undergo hysterectomy. All the other cases responded favourably, including, in aggregate, the five cases of haemorrhages of puberty.

Radiation therapy—radium and/or deep X-ray therapy—has a definite place in the treatment of metropathias and no serious hormonal imbalance can result therefrom.

This article was contributed to the Sir A. L. Mudaliar's 61st birthday commemoration volume.

INTERESTING CASE REPORTS

Extra - Uterine Abdominal Pregnancy

DR. M. P. JOSEPH B.A., M.B.B.S., D.M.R.,
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Previous history:—Mrs. E.V.M., age 30. Last menses—16th January, 1946.

From the 1st week of April had slight pain round the waist and in the stomach and used to consult the doctor every fortnight at Ordnance Factory Child Welfare Clinic at Kirkee.

1st attack of severe pain:—10.7.46 early morning 4-30 when she got up from sleep. Passed urine with difficulty, pain severe for about $\frac{1}{2}$ an hour. Then subsided a little, but still could not walk straight. Brought doctor and got examined—some mixture was given. She was alright after the 1st day but still could not walk straight for another 2 days.

2nd attack:—14.7.46 the time and the pain as on the previous occasion—was alright after 1 day.

3rd attack:—17.7.46 slight pain early morning and could not walk straight. Severe attack from 11 a.m. to 12 noon. Afterwards a little better but could not walk straight—taken to hospital at 5 p.m. and immediately was given an injection—had giddiness and headache and

was given one dose of sleeping mixture—slept at night. Was kept in bed till the morning of 21.7.46. No pain for two weeks.

Left Kirkee on 29.7.46 and arrived at Ernakulam on 31.7.46.

4th attack:—9.8.46 pain from 9 a.m., more severe than on the previous occasions, severe till evening—could not sleep on bed—was lying in easy chair with pillow at the back.

5th attack:—Severe pain started again on 11.8.46 at 7 a.m. lasted for two days.

6th attack:—18.8.46 pain at night. The pain was moderate in intensity. Up till then the movements of the foetus were felt.

Last and the most severe attack:—(7th attack) from 18.9.46 to 7.10.46 lasted for 20 days—extremely severe. Given mixture and enema daily—used to get some relief when enema was given—was sleeping only in easy chair with pillow at the back—didn't feel the movements of the foetus after this attack. She had no pain afterwards.

General.—In all the severe attacks there was pain in the chest, difficulty

in breathing and vomiting and on the first four occasions when the pain started, difficulty in passing urine, and perspiration. When the pain was severe the legs became cold and there was a generalised abdominal pain and it was not possible for the doctor to examine. She couldn't walk straight on all occasions; even when the pain was slight. On the last four occasions she was unable to sleep flat on bed whereas in the first 3, it was possible to do so—there was no rise in temperature at all on any occasion. Radiograph of abdomen taken on 22-10-'46, showed foetal parts—was admitted to the hospital on 31-10-'46 given castor oil 2 days—5 injections of Pituitrin and 25 doses of Quinine mixture to induce labour—but no effect—tried to dilate the uterus by plug—no success. There was slight discharge of blood from 1-11-'46 to 20-11-'46. Returned from the hospital on 19-11-'46. Health improved in the house—no temperature or any pain.

Was given 12 injections of 1 c.c. (each c.c. 10,000 i.u.) of Oestroform between 13-12-'46 and 16-12-'46.

A history of 7 acute attacks of severe pain in the abdomen from the 2nd month of pregnancy till a few days before admission to the General Hospital for delivery on the due date.

On admission nothing was suspected. LOA and normal pelvic measurements. Foetal heart could be heard 15 days after due date—slight pain in the abdomen continued for three days. There was no dilatation of the os. Simple measures as Quinine mixture, light packing of the os were tried to induce pains without result.

Plain picture showed full-term foetus. Further examination after 3 days showed the following:—



FIG. 1
Plain abdomen showing foetal parts.

1. Foetal heart not heard.
2. No pains, no complaints. Hence a diagnosis of death of the foetus was made.

Patient was kept in the hospital for 15 days without any complaint. A decision, not to interfere unless there was sufficient indications was made and patient was sent home and kept under observation. Nothing happened for a month. Oestrin was administered with a view to induce pain. Patient had a normal period. So an extra-uterine pregnancy was suspected. P.V. was done and uterine sound passed, uterus slightly enlarged and separate from the tumour mass (there was great difficulty to differentiate).



FIG. 2
After Hysterography showing uterine cavity and foetal parts in the abdomen.

Hysterography was done.—*Report.* Uterus is displaced to the right. The dead foetus is outside the cavity of the uterus and attached partly to the

anterior abdominal wall and left Fallopian tube.

Diagnosis of extra-uterine pregnancy was confirmed.

15 days more were allowed for the placenta to completely degenerate to facilitate easy removal and prevent bleeding.

Operation notes:—By DR. M. J. ITTOOP. Under general chloroform anaesthesia, abdomen was opened by right paramedian incision 9 inches long. On opening the peritoneum a thick sac of the consistency of an ovarian cyst of long duration was encountered. This sac was adherent lightly to the entire anterior abdominal wall especially to the left sub-umbilical region. The adhesions were gently and without much difficulty separated by fingers. Superiorly and posteriorly there were no adhesions with the abdominal viscera. Without much difficulty the entire sac with contents was brought outside the abdominal wound. The sac was found attached by three or four finger-like processes to the left Fallopian tube and to the posterior aspect of the left broad ligament. The left ovary was separate and distinguishable. The structures were clamped, cut and the sac was removed in its entirety. On further examination of the abdominal cavity the right ovary and tubes were found to be normal, the uterus slightly bigger

in size and pushed to the right side. The left ovary was slightly enlarged and contained two ovarian cysts of the size of a marble. The cysts were punctured. The clamp stumps were ligatured and peritonised. The peritonium in the sub-umbilical region on the anterior abdominal wall which was fairly well adherent to the sac had plenty of small hairs sticking to it. Most of it were removed with the help of gauze. The abdominal cavity was wiped dry and the wound closed in layers without a drainage.

Time for operation, 40 minutes.

On opening the sac, one pint of turbid fluid came out and inside there was a full-term, slightly macerated foetus which was sent to the laboratory for preservation.

Progress of the Case. Patient was put to bed. Intra-muscular Glucose Saline was given and the patient was kept under 1/6 gr. dose of Morphia with Atropine, for the next 24 hours.

1st day after operation: Temperature 101.5°F. Looked cheerful. Passed urine in the night. Abdomen soft.

2nd day:—Progress satisfactory. Temp. 100°F. Fluid diet.

3rd day:—Temperature normal. No complaints.

4th day:—Glycerine enema.

8th day:—Stitches were removed. Wound healed by first intention.

9th day:—Complained of slight pain in the region of the left side of the abdomen. On examination slight tenderness on the left side. No rigidity—no mass felt—P.V. Tenderness and a mass of the size of a lime on the left side could be noticed. Total W.B.C. 10,000 per cmm. Patient put on Cibazol 2 tablets every 4 hours and Alkaline mixture. Evening temperature shot up to 104°F. Patient was restless and vomited several times. There was severe pain on the left side.

10th day:—Penicillin substituted for Cibazol 8 lacs. 40,000 units c.c. every 3 hours hot vaginal douches. Evening temp. 99.4°F. No vomiting, no restlessness. Tenderness left side + pain +

11th day:—Penicillin continued. Temp. normal. Pain nil. Tenderness slight.

12th day:—Penicillin continued. No tenderness, no temperature. Mass +

13th day:—Penicillin till 2 p.m. Ordered Cibazol 2 tablets every 4 hours after 2 p.m. and Alkaline diuretic mixture 8 p.m. Patient restless, vomiting severe. Pain on the left side. Temp. 105°F. Pulse rapid. I.V. Glucose 25% 20 c.c. with Redoxon 5 c.c. Suspected idiosyncrasy to Cibazol. Stopped Cibazol. 1 tablet of Nicotinic acid t.d.s.

14th day:—Temp. 100°F. Pain stopped general condition better.

15th day:—Temp. normal. No pain.

16th—21st day:—Patient had an uneventful stay in the hospital.

22nd day:—P.V. lump of the size of a lime in the left fornix. No pain.

After one month the patient was examined. Patient in good health. P.V.—small lump in the left fornix.

At the time of this article the patient is living with her husband in Poona. She had normal periods two months after operation and is now leading a healthy normal life.

Summary.—1. Three diagnostic

measures were used to confirm the diagnosis. (a) Vaginal examination. (b) Hysterography. (c) Oestrin.

2. In case of a dead foetus it is best not to interfere until there are indications.

3. In case of extra uterine pregnancy with full term foetus best time for operation is 2 to 3 months after the death of the foetus.

I am deeply grateful to DR. JOSEPH ITTOOP, Civil Surgeon, General Hospital, Ernakulam, for his valuable suggestions and permission to publish this article and to DR. S. VASAVA MENON for his help in preparing this article.

NOTICE TO CONTRIBUTORS

Contributions are to be sent to one of the joint Editors, 'The Indian Journal of Radiology' Rao Bahadur Dr. P. Rama Rau, D.M.R. (Vienna), The Madras Radiological Institute, 155-157, Poonamallee High Road, Kilpauk, Madras 10, or Dr. K. Manjunath Rai, F.R.C.S. (Edin.), D.M.R. (Lond.), Barnard Institute of Radiology, Govt. General Hospital, Madras.

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No. 1.

Editorial

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IT is with great pleasure I contribute an introduction to the first number of the second volume of our journal during the year. The year 1947 has been a memorable one in the history of India. The events that have taken place in the short space of a few months have been unparalleled in the history of the world. India has emerged as a free and independent country after years of bitter struggle and disappointments. Unfortunately this happy and gratifying ending was soon marred by the senseless, savage orgy of indiscriminate murder, arson, looting and other indescribable crimes in certain parts of the country which has blackened and marred the good name of this country in the eyes of the world. That India, free, could behave with such brutal and barbaric savagery on the threshold of her freedom will remain a matter of severe condemnation for a long time. Many of our colleagues have suffered terribly, they have lost all that they had built up in the course of years, they have barely escaped with their lives. Our hearts go out to them and it is our paramount duty to do all we can to rehabilitate their shattered lives and careers and put them on their feet again. I call upon the members of our society to subscribe freely to the list that has been opened. It is only a short time back that we concluded a momentous session of the Second Indian Radiological Congress. It was the first session after India attained her Independence and it was the first organised attempt for all faculties to meet under one roof and at one time. The success of this joint conferences has been due to the untiring efforts of the various committees that were entrusted with the

task. Our warm thanks are due to them and particularly to two of our members who represented us on the Co-ordinating Committee. DR. M. D. JOSHI, our ex-President and DR. R. F. SETHNA, our local Secretary worked incessantly and with utter disregard of their time and professional engagements. It is my pleasant duty to record their achievements here. An attempt was made some years back in the direction of a combined session under the aegis of the Indian Medical Association at their meeting in Bombay. All the specialities were represented. There was only one afternoon session for Radiology, but the attendance was much smaller. Such combined conferences have their advantages; unfortunately there was a great deal of overlapping in the meetings of the different sections, which could have been avoided by spreading out the proceedings, so that the prime object of a joint session could be achieved in its entirety. Keeping this in mind, we have resolved to meet in Calcutta in December next a few days prior to the meeting of the other faculties.

We were singularly fortunate in having DR. JIVARAJ N. MEHTA, first Director-General of Health and Medical Services under the new regime to inaugurate our Conference. A man of outstanding abilities and vast administrative experience, he will, one feels certain, be able to

initiate post-war reconstruction schemes and achieve where others have failed. Radical changes will have to be made as the needs of this country are pressing and imperative. Infectious diseases and diseases that could be prevented are rampant. The state of civilisation of any country can be adequately gauged by the incidence and death rate in such diseases. Judged by these standards, India is far behind other foreign countries, so that an extensive programme of improved medical facilities is urgently needed. Very feeble attempts have so far been made to minimise the ravages of tuberculosis; the Cancer problem as rampant here as in other countries, is practically untouched. It is now universally recognised that Mass Radiography is a very potent weapon in the fight against Tuberculosis. In a vast country like India, its universal application is not a practicable proposition. But a great deal can be done by voluntary co-operation of large employers of labour as in our industries, in our public services, in our railways and transport companies. If such voluntary co-operation is not forthcoming, appropriate legislation could make it compulsory. Medical inspection of school children is now universally adopted. As Tuberculosis claims its victims from the young preponderantly, Mass Radiography should

form part of their medical examination. In the case of cancer, except for very few centres, no facilities whatever are provided in such a big country as ours. It is our experience at the Tata Memorial Hospital that patients have to come long distances from all over India at great cost and inconvenience. An adequate health programme would have to provide for many more centres and clinics, so that the patient can be efficiently treated near his home town. A Tumour Clinic does not merely mean the provision of a few milligrams of Radium and a Deep Therapy Machine. It requires a co-ordinated effort with a specialised staff and facilities for clinical, radiological and pathological examinations and adequate equipment for treatment. If such an elaborate organisation is found too expensive, as it is bound to be, a modified scheme could be evolved for each Province, such as a Central Hospital with full facilities for research, treatment and diagnosis with additional staff who could tour round the districts regularly once a week or fortnight. Such a scheme is operating with great success in Manchester with the Holt Radium and X-ray Institute as the centre. Our entire reliance is on early diagnosis, which offers the only hope for a cure. As the diagnosis in the first instance will depend on the knowledge and experience of the general practitioner

several weeks training in a cancer hospital or clinic should be made compulsory before granting the degree, and suitable changes should be made in the University curriculum making the study of cancer a main subject.

Medical relief should be comprehensive enough to reach each and every nook and corner of India, to every small town and village. It should include an efficient Radiological service which at present is confined to the big cities. Every hospital however small should be equipped with an X-ray apparatus, which need not be elaborate. In the large towns and cities, departments should be complete with facilities for specialised diagnostic procedures and for treatment. Mobile X-ray units which were extensively used during the war can be transported to the villages so that routine everyday emergencies can be tackled.

There are several centres in India where training of Radiologists is undertaken. These courses are unfortunately inadequate and should be suitably revised to meet modern requirements. Instead of nine months or a year the training period should be extended to two years and more. An internship in the major departments of Surgery and Medicine should be a pre-requisite prior to joining the course. At least six months of the course should be spent

at a Tumour Clinic or Hospital. The prospects for our Radiologists should be bright, considering the vast schemes for expansion in medical relief.

A great deal of controversy is going on regarding the teaching of medical students. In that connection it is important to point out that the study of the major subjects could be made more interesting, more realistic and more instructive with the help of radiological demonstrations, and that clinical teaching and research should be intimately and closely correlated with the X-ray findings. Many Therapy centres have sprung up of late. It is essential that treatment to be effective should be standardised and should be carried out in conformity with modern concepts of the subject. Haphazard treatment can result in a great deal of harm and deserves severe condemnation. The need for properly trained Physicists is more and more imperative. A training

centre should be started as a first step in this direction so that in 2 or 3 years' time their services may be available in centres where such work is undertaken. The importance of this aspect of the problem was the subject of discussion at our Second Congress of Radiology recently concluded. Let us hope that when we meet next this phase of the problem will receive suitable recognition and solution.

Our thanks are due to DR. M. D. JOSHI, the immediate past President for his valuable contribution during his term of office. Our thanks are due to the Joint Editors of the Journal, DR. RAMA RAU and DR. RAI of Madras for making it a conspicuous achievement. Lastly our thanks are due to all our colleagues for having contributed so largely to the success of our Conference held in Bombay. A great deal of work is in front of us; with your co-operation and collaboration much will be achieved.

An Account of Medical Conferences in Bombay

24th to 30th Dec., 1947.

Dr. R. F. SETHNA, M.B., B.S., D.M.R.E.,
Conference Secretary.

It was for the first time in the history of medical profession in India that practically all branches of medical science met in conference simultaneously in Bombay during the X'mas week of 1947 in the spacious compound of Sir J. J. Group of Hospitals under the auspices of the I.M.A.

It was fitting that the honour of holding the conference at the site should go to this particular medical institution as it is one of the oldest in this country having celebrated its centenary in 1945.

The following specialists met in conference:

- 2nd Indian Congress of Radiology.
- 24th All India Medical Conference.
- 5th All India Obstetric and Gynaecological Congress.
- 9th Conference of the Association of Surgeons of India.
- 25th Annual Conference of the All India Medical Licentiates Association.
- 1st Conference of the Association of Dermatologists and Venereologists of India.
- 1st Conference of Oto-Laryngologists of India.

A tremendous amount of spade work had to be gone through under the very able guidance of the Organising Secretary, DR. CHAMANLAL MEHTA. Each of

the above group had one or more representative on the following committees:—

- (1) Co-ordination.
- (2) Finance.
- (3) Accommodation, food and entertainment.
- (4) Scientific Exhibition.

Radiologists were represented on Co-ordination and Finance Committees by DR. M. D. JOSHI, the President of Indian Radiological Association. I represented the Association on all other committees as also the Co-ordination Committee. Periodical meetings were held from 2nd September right upto the commencement of the Conference where all points were discussed and various decisions taken.

Special mention must be made of the very hard work put up by B. R. NAYAN and DR. S. V. OAK for the arrangements of the accommodation and transport and DR. DESA, for food supply of the conference.

The inauguration of the 24th All India Medical Conference by H. E. Sir JOHN COLVILLE was attended by representatives of all branches of the profession.

It was held in spacious pandal and was attended by well over three thousand people. The President of the I. M. A. LT.-COL. AMIRCHAND also addressed the Conference.

The 2nd Indian Congress of Radiology was inaugurated on X'mas day by

Dr. JIVARAJ MEHTA, Secretary to the Ministry of Health and Director-General Health Services Government of India. In his inaugural address, he stressed the urgent need of devising a course of training in Radiology for the undergraduates as well as for post-graduates. The importance of research in Radiology and providing radiological service to people all over the country was also recognised by him. The other points he stressed was promotion of an X-ray and Electro-medical Industry in this country and for expansion of the means of early diagnosis and treatment of cancer patients.

Dr. K. P. MODY was installed the President for the ensuing year.

The Scientific Sessions were then held and continued till 30th December. Many interesting papers were read and the discussions on them were equally illuminating.

There were symposia arranged by I.M.A. In two of them, namely Functional Uterine Bleeding and Appendicitis, Radiologists took a prominent part.

Social side :—Under the auspices of the I.M.A. there were arranged various social functions. The most important was the function arranged by the Mayor of Bombay, who gave a civic reception to all delegates and visitors to the conference.

There was also felicitation to Dr. JIVARAJ MEHTA by the conference on his appointment to the high post in the Government of India.

Entertainment :—Those attending the conference were entertained by well-

known artists with singing, dancing and music. These functions were held in the main pandal at night and were greatly appreciated by the audience. Two boat trips were also arranged and people attending enjoyed these moonlight trips thoroughly.

Scientific Exhibition :—The Scientific Exhibition was held in the Physiology Building. Radiology Section was situated on the first floor and radiograms of great academic interest were exhibited on two wooden frames with neon tube lighting system. Another batch of radiograms replaced the first ones after three days to keep up the interest in the Radiological exhibits.

In addition to that, old X-ray tubes dating back to 1910 and onwards and the latest ones in use were exhibited. There were also photos of latest million volt deep therapy apparatus. Photographs of Apostles of Science who had taken a notable part leading up to the discovery of X-rays and prominent radiologists were also shown.

Prints of radiograms of great interest and of old historical ones taken by Dr. ROENTGEN and photos of his laboratory were also exhibited, by courtesy of Messrs Kodak Ltd.

Here I may mention, that Dr. M. MANI of Messrs Kodak Ltd., helped me throughout in organising the scientific exhibits and I owe him and Messrs Kodak Ltd., a high debt of gratitude for making the Radiological Scientific Exhibits such a great success.

The surgeons, physicians and others had their own scientific sections in which specimens (pathological), instruments,

photos and documents of development of Sir J. J. Group of hospitals from its early small beginning to its present status, old diplomas, charts of various diseases prevalent in India, charts of infant mortality rate and papers published by Bombay Medical men were all exhibited. The Haffekine Institute had interesting exhibits of blood serum preparation and blood bank.

Commercial Exhibition :—About 60 commercial firms, pharmaceutical (Indian and foreign), surgical instruments and appliances, manufacturers and foreign firms dealing in Electro-medical and X-ray apparatus took part in the exhibition which was a huge success and very largely attended.

In all, the I.M.A., expected about 600 medical men to attend the conference from all over India as indicated by letters from different parts and estimates fell far short of the attendance figures which came upto about 1800 medical men from different parts of the country. Most of them came without any previous intimation of any sort and it was with the greatest difficulty that the I.M.A. could find accommodation for them. Their food and catering resources were strained to the utmost and very great credit is due to the organisers and medical student

volunteers that they were able to cope with the situation to the satisfaction of most of the visitors. This last-minute influx of large numbers of medical men from various parts of the country show an utter lack of consideration on their part for the very difficult situation they would put the organisers to, without any previous intimation.

Anyway, this experiment of the I.M.A. to hold the medical conferences of different specialities at the same venue has proved a great success. The I.M.A. is celebrating its Silver Jubilee next year in Calcutta and in order that they make it a great success, many of the associations including ours are also meeting in Calcutta. The only change is that different associations will meet on separate days during month of December 1948.

In all about 60 Radiologists including those of Bombay attended the Conference. This small number was mainly due to un-settled political situation in the country and the partition of India.

It is my earnest wish, India will have passed with success the great difficulties and our country will be on road to peace and prosperity the next time we meet in Calcutta.

Second Indian Congress of Radiology, Bombay

24th to 29th Dec., 1947

Welcome Address

Dr. M. D. JOSHI, M.B., B.S., F.C.P.S., D.M.R.E., J.P.,
Outgoing President and Chairman of the Reception Committee.

Secretary to the Ministry of Health
 & Director-General of Health Services
 Government of India, Ladies and
 Gentlemen,

I have great pleasure in welcoming you all to this Second Indian Congress of Radiology. This Congress is characterised by two great events. The first and foremost is that we are holding this Congress in free and liberated India. Secondly, this is the first time in medical history of India that the Conferences of almost all branches of medical science are being held at one time and at one place. I think this is a great achievement the medical profession has made and if this unity and co-operation of medical people grows, the future of medical science and profession in India is bright.

The Second World War is over. Still the evil effects of war are not over. They are more keenly felt now than when the war was going on. There is scarcity of food, accommodation and other necessities of life. So if some medical brethren feel that the lodging and boarding arrangements are not upto their expectations, I hope they will please forgive us. We want to make you happy and comfortable and we are doing our best, under the prevailing circumstances. No efforts have been spared for this purpose.

We have taken great efforts in arranging the Scientific Exhibition. Skia-grams of all typical pathological conditions have been kept for demonstration. I hope that you will find them interesting. Many prominent Radiologists, Pathologists and Physicists are taking part in lecturing and discussing in scientific sessions and I hope that your troubles and sacrifices in coming over to this Congress will be fully compensated. Gentlemen, I greet you all and hope your short stay in Bombay will be comfortable and happy.

My next duty is to introduce to you Dr. Jivaraj N. Mehta. It is a mere formality, because you all know him well. He is a great patriot and has done great service to his country. He had a brilliant career as a medical student, both in India and England. He wanted to serve his country. With this view before him he joined as a Dean of K.E.M. Hospital and G. S. Medical College. He worked there for 20 years and brought both these institutions to highest pitch of efficiency. Not only he taught medicine to the students but he instilled in them the principles of patriotism and self-sacrifice by his own example. This is obvious from the fact that two batches of medical men went to Delhi to give relief to the refugees. Our Central Government must be congratulated upon

Second Indian Congress of Radiology

in securing the services of such an eminent person. They could not have made a better choice.

As Dr. Jivaraj knows the difficulties of the medical profession, I hope in his regime, medical profession will be greatly benefited. In my last Presidential Address, I had suggested three things for the advancement of Radiological Science in India. The first one is to start teaching of Radiology in India. Bombay and Madras Universities have already started diplomas for graduates and College of Physicians and Surgeons have also started a course for Licentiate. Second thing is to start a Radiological Journal and that also has been already started and I must acknowledge

that due to efforts of Dr. Rama Rau, Dr. Rai. and Dr. U. Krishna Rau, it is a great success. Third thing is to start an industry where X-ray machines and its accessories as well as X-ray films and developing material can be manufactured. This thing can be done only by the Government. As Government intends to start new industries, I hope Government will take into consideration this difficulty of ours. When X-ray machines are manufactured in India, the cost of Radiological examination will be much lower and the poor can have the advantage of radiological science. With these words I request Dr. Jivaraj N. Mehta to inaugurate the Second Indian Congress of Radiology.

Inaugural Address

Dr. N. JIVARAJ MEHTA, M.D. (Lond.), M.R.C.P. (Lond.),

*Secretary, Ministry of Health, & Director-General
 of Health Services, Government of India*

Before the Second Indian Congress of Radiology, held at Bombay
 on 25th December, 1947.

Ladies and Gentlemen,

I am deeply grateful for this opportunity of associating myself with the Second Indian Congress of Radiology. It is indeed a great pleasure and privilege to be invited to inaugurate this Congress.

Though it is just over 52 years that X-rays were first discovered, Radiology is, in relation to the other branches of the science and art of Medicine, a relatively recent development and yet it has already established for itself an assured place as a potent and increasingly useful

agent in the ever-advancing field, of diagnosis and treatment of disease. In the diagnostic field, as you are well aware, it is through Radiology that we have got new ideas and data in anatomy and physiology, that we are able to visualise hidden organs and study their functions, and more important still we are able to study the pathology of the living in contrast to the pathology of the dead. With its aid, we can avoid the guess work and give positive opinions which would have been impossible otherwise. In the field of treatment, apart

from curing many a benign condition and relieving others, radiation therapy plays a very important part in the fight against cancer.

In India we are to-day well behind western countries in many branches of Medicine and, in respect of Radiology, our position is no better or it is perhaps even worse than in regard to others. It is therefore essential that the importance of Radiology should be fully recognised and that every effort should be made to advance the teaching and practice of the subject in a manner designed to make the country able not only to provide radiological service to the people, of the best type available elsewhere, but also to carry out active research and thus help to advance the range of usefulness of the science of Radiology.

In promoting the progress of any branch of scientific or cultural activity a Society formed by the exponents of the particular branch of science or art has always performed a prominent part and it is gratifying to note that an Indian Radiological Association was formed as far back as sixteen years ago. The next stage was the inauguration of the first Indian Congress of Radiology in February 1946 in Madras at which, from among a total membership of 145, 76 members from all over India and Ceylon were present and 50 local medical men also participated in the proceedings of the Congress. These developments have come none too soon in the history of Radiology in India and the stage has now been set for organising a determined effort to advance the cause of Radiology in the interests of the science itself and of the

people whom it is intended to serve. I do hope that the present and subsequent meetings of the Indian Congress of Radiology will help to register progress by laying down for the guidance of the medical profession, of universities and of administrators, the steps to be undertaken for promoting the development of Radiology as a science and as an art with the greatest possible speed. Recognising as I do the unlimited field that the future will open for the utilisation of radiant energy for the alleviation of human suffering and for the promotion of human health and happiness I feel all the more thankful for this opportunity which the organisers of the Second Congress have given me to associate myself with the work of this gathering of distinguished Radiologists from all parts of the country.

The Congress has set before itself a varied programme of interesting subjects for discussion and it is not for me, while inaugurating its proceedings, to anticipate the valuable contributions that will no doubt be made by the different members in regard to particular subjects during the proceedings of the Congress. I would, nevertheless, crave your indulgence for referring briefly to two aspects of the problem in which we are interested, namely, the organisation of teaching and research facilities in the field of Radiology and, secondly, the utilisation of the resources which radiant energy has already placed at our disposal and will continue to do so in an increasing measure in the coming years, for the campaign against malignant disease.

Teaching and research in Radiology:—The first need appears to be for

devising a course of training in Radiology which can be fitted into the undergraduate medical curriculum. In this connection the question of adequate provision of teaching in Biophysics will also require consideration. As was pointed by your President of last year's Congress, Dr. M. D. Joshi, the establishment of Chairs of Radiology, at least in selected medical colleges or under the auspices of the universities concerned, will have to be undertaken without delay. For post-graduate training the modern tendency for specialisation in particular branches of individual subjects is noticeable in Radiology also, special courses having been developed for the diagnostic and therapeutic aspects of the subject. May I put forward the suggestion that this Congress should appoint a small committee which would be charged with the duty of drawing up suitable programmes of training in Radiology for undergraduates and post-graduates and for placing before Universities, Governments and other authorities who are concerned, a plan of development which will facilitate uniformity in the teaching of the subject throughout the country!

It is being accepted everywhere that sound teaching in any subject cannot be developed if it is divorced from active research. Provision will therefore have to be made for the staffing and equipment of the proposed Departments of Radiology for enabling them to perform adequately their dual function of offering proper instruction in the subject and of actively pursuing research.

I may also mention that the question of training radiographers in sufficient

numbers should not be lost sight of and that the programme drawn up by the committee should make provision for this class of workers also.

The campaign against malignant disease.—Radiology has already done much to aid Surgery in the diagnosis and treatment of malignant disease and further developments through research will no doubt widen its field of useful activity. Nevertheless, in view of the obscurity which still surrounds the problem of the genesis of cancer, there appears to be no single and effective method of preventing the development of the disease or of dealing with it effectively when it has become well established. Biochemical agents, radium, X-ray therapy and the surgeons knife have all their place in dealing with cancer and the co-operation of these types of workers is essential for a co-ordinated attack on the problem of its diagnosis and treatment. Such co-operative work can be developed in special Cancer Institutes such as the Tata Memorial Cancer Hospital as well as in Universities where, with the proposed establishment of Chairs of Radiology, it should be possible to bring together medical and non-medical workers, such as Biochemists and Physicists to help in the organisation of well-planned research into the various problems of cancer. I would plead that, in view of the limited funds only which India can afford to spend, the purpose in view should be to establish one or two such centres and to develop them into sound institutions for training and research rather than attempt to multiply them all over the country with the almost inevitable result

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that they will all function ineffectively. In my view what we should aim at, particularly at the present juncture, is quality and not numbers.

In dealing with cancer as a community problem there are other equally important questions to consider. The education of the general practitioner in the early diagnosis of the disease or at least recognition of the conditions which call for more expert examination than he is himself able to provide is an essential development. Side by side with it there should also be a considerable expansion of diagnosis and treatment facilities for malignant disease. The places where facilities for radium treatment exist are only eight, namely, Delhi, Agra, Patna, Madras, Vizagapatam, Calcutta, Shillong and Bombay. Of these provision for deep X-ray does not exist in Shillong and Delhi.

No expansion of medical services will, however, produce adequate results in our campaign against cancer without the education of the people in seeking proper medical aid for the diagnosis of suspected disease and for the elimination of factors in the dietetic and other habits of the people which are likely to be the predisposing factors. In a country like ours with its backwardness in general education, it is by no means easy to make the general public cancer-minded. Even so, each medical practitioner will be able to exercise a beneficent influence within his or her own sphere of professional activity by helping to spread useful knowledge in respect of the disease. The appeal that I am making to-day is not therefore limited to the distinguished

gathering of Radiologists who are present here but to the large body of medical men and women in the country who are, I hold, primarily responsible for enlightening the public in regard to health and disease and for promoting the growth of a public opinion which will demand the establishment, through the efforts of the State and of voluntary bodies of those conditions for healthful living which alone can provide the foundation for a superstructure of sound public health. The training of the people for active participation in the treatment and prevention of malignant disease is a part of such a programme of health education.

It must be remembered that India is a poor and undeveloped country and we must devise ways and means by which we may achieve progress all round. To achieve the objectives mentioned above I would briefly summarise the steps necessary for the purpose.

1. Close co-operation between Physicians, Engineers and members of the medical profession.
2. Promotion of an X-ray Electro-medical Industry, to enable this country not only to be self-sufficient so far as specialised equipment is concerned but to have the same at cheap prices.
3. Establishment of a factory for the manufacture of X-ray films and chemicals in this country.
4. Facilities for post-graduate study in this speciality in a larger measure than is obtainable to-day.
5. Facilities for research, particularly in Biophysics, Physics of X-rays and Radium, Diagnostic and Therapeutic

Radiology. For this purpose, it would be advisable to create Chairs in Radiology in various Universities and Medical Colleges.

I hope the Indian Radiological Association will consider these suggestions and put forward concrete proposals and

see to it that they are carried out. It is thus only that the Association will justify its existence and render adequate services to this country and its people and the humanity at large.

I have great pleasure in inaugurating the Second Indian Congress of Radiology.

Induction of President

Dr. M. D. JOSHI.

I have great pleasure in installing Dr. K. P. MODY, President-elect as President of this Congress, and also of Indian Radiological Association for the year 1948. He is practising Radiology for more than 25 years in Bombay and has earned great reputation as a Radiologist. He has worked as Hon. Radiologist in

G. T. Hospital, Parsee General Hospital and also in Marine Hospital. Now he is head of the Radiological Department in Tata Memorial Hospital. I invest him with the Collar and Jewel of his Office and wish him every success. I now request him to deliver, his Presidential Address.

Presidential Address

Dr. K. P. MODY, B.A., F.C.P.S. (Bombay), D.M.R. (England),
Head of the Department of Radiology, Tata Memorial Hospital, Bombay.

When I was offered the Presidentship of the Second Indian Congress of Radiology, I accepted it with a light heart. My conception of the Presidential appointment was that he was to be an ornamental head, and that all he had to do was to sit back and relax and listen to the nice compliments usually paid on such occasions. But, when I thought about it a little more and particularly when I recalled to my mind the great contributions that have been made by my distinguished predecessors in the Presidential Chair in this section as well as in other branches of Medicine, I felt that

I had serious responsibilities. In this connection, I recall the valuable work done by my predecessor Dr. JOSHI who had the honour of being the first President of the Indian Congress of Radiology held in Madras in early 1946.

We are singularly fortunate and greatly honoured that the first Indian Director-General of Health has delivered the Inaugural Address. With him at the head of affairs, we are looking forward to great post-war expansion of our hospitals and health services. With his great abilities he will be able to achieve where others failed.

I am sure he will bear in mind the paramount necessity of providing adequate Radiological services to the teeming population of our villages and towns. Mobile X-ray units can be made available to every small town and village. Apart from malaria and infectious diseases which ravage the countryside, there are tuberculosis and cancer. We look upto him to install mass radiography and establish tumour clinics in all big centres.

I have great pleasure in welcoming you to our great city of Bombay, great not merely because of its teeming population and extent but because of the vast achievements in different spheres of life, its cosmopolitan character and above all its balanced outlook and freedom from political and communal strife. I hope you will come again in a few years when we promise you a still bigger and better Bombay.

This is a unique occasion, it is the first meeting of the medical faculty after India has attained independent status. We, however, ought not to stress this point, as Science and Medicine have always enjoyed an independent status free from the turmoil of politics and petty party considerations. What is really unique is the large attendance of medical men of different specialities, general practitioners, physicians, surgeons, gynaecologists all under one roof. This is a recognition of the great unitarian principle that medical science is one and that there is no scope for water tight compartments. The patient has to be studied as a whole and not in so many little bits. It is the bane of specialisation that we are apt to consider the

patient's problems from the narrow angle of our own speciality. This large gathering of men with varied activities is a sign of the times and a tacit recognition that co-operation and collaboration are the essence of modern medicine. The worst offender in this respect is the Radiologist. He is too much engrossed in the technical details of his work, talks a lot about shadows and infiltrations and too little about the diagnosis. We have no excuse for shirking our responsibilities, we have the patient with us whom we can examine clinically, he is usually ready with other laboratory tests, and what is still more important, it is our responsibility as to what further examinations should be done and what further procedures should be adopted. Let us realise and make others realise that we are not mere technicians and radiographers but that we are in the position of consultants. We will not inspire confidence and respect from our colleagues by merely holding diplomas and degrees, we have to live upto our responsibilities, otherwise we shall always be relegated to a subsidiary status.

It is now 52 years since X-rays were discovered. Within this short space of time Radiology has developed to an extent which has compelled its adoption into the family of medical science on an equal footing with the others. It has won an enviable place of power, privilege and respect. What is more, in keeping with marvellous achievements of Radiology, the radiologist himself has risen from a lowly and subordinate status to one of independence and recognised equality with other specialities. In our everyday routine, we have to deal with

all possible problems, medical, surgical, gynaecological and those belonging to the specialities. Moreover, we must have a comprehensive knowledge of such basic subjects as Anatomy, Physiology and Pathology. Our standard of education should therefore be necessarily high. Diploma examinations were first introduced in Cambridge with a nine months course. They were then introduced in London and at other centres in the U.K. In India, I believe Madras was the first to start such a course, followed by Bombay and other centres. The curricula are totally inadequate considering the vast advances in Radiology and the large volume of literature that has sprung up. This fact is being recognised by the English Universities and their courses have been extended to two years and more. The Americans have gone into this question very thoroughly and their diploma courses are on a much broader basis. Before he can take up the course the student is required to be an intern in the major departments. Such a system should be introduced in our Universities and the course should be extended to two years. Moreover, as Radiation is so largely used in cancer and malignant diseases, the student should be required to put in 4 months at least in a recognised Tumour clinic or Cancer hospital. In this connection, I must also refer to the deplorable lack of knowledge of the fundamentals of Radiology particularly of Therapy amongst our medical men. At least in the higher examinations, a proper understanding of the subject should be incorporated in the curriculum. This is coming to be recognised in the United States where surgeon

radiologists are coming up as a class by themselves. At the University of Birmingham, the study of Anatomy and Physiology are carried out with the aid of radiological demonstrations. Such up-to-date methods should be incorporated in our University curricula so that the student passes out with a comprehensive background of modern developments.

The most outstanding achievement of our Association after our first Congress has been the publication of the Journal. Our warm thanks are due to the Editors, Dr. Rao Bahadur P. RAMA RAU and Dr. RAI for making it such a marked success. If we are to maintain our prestige and standing in the profession, we should all of us take more interest in its publication and freely contribute to its columns. We have amongst us first class men and have ample material to draw upon. If we wish to stand up in the eyes of the profession at large we ought to cultivate the habit of attending regular meetings and Congress. There is no better education than to be able to meet one another and discuss our problems.

Recently we celebrated the half century of Roentgen's discovery, when we reviewed the progress that had been made during the 50 years. Here, I will refer only to a few outstanding achievements. Newer dye compounds such as Pheniodol and Pyelosil have made great contributions to the diagnosis of gall-bladder and kidney diseases. Arteriography, angiocardiology, encephalography and such other highly elaborate procedures have become standardised

procedures. The value of mucosal studies in the gastro-intestinal tract have come to be more and more recognised. In therapy, the super-voltages have attracted a great deal of attention. It is now over 10 years since their introduction, most of the technical difficulties have been overcome, and units working at 1 to 3 million volts are now available for routine treatment. In properly selected cases better results are obtained, life is somewhat prolonged and skin damage is minimised. But unfortunately there is no evidence that more tumours are destroyed by this method than by routine treatment.

As radiation is so extensively used in malignant diseases a reference to the subject is called for. Great are the achievements of radiation in the treatment of the disease, but in spite of the progress made, our shortcomings are deplorable. Disappearance of the primary growth without mutilation is a great achievement indeed, but unfortunately we are unable to prevent metastasis, so that disappearance of the growth and curability do not go hand in hand. Radio-active substances and synthetic products, particularly the Nitrogen Mustard group are being tried out. These when introduced into the system act upon newplastic cells not only in the primary but wherever they are, by selective absorption.

So far our only hope lies in early diagnosis. A vigorous anti-cancer campaign by press propaganda, radio talks, popular lectures and demonstrations will go a long way to get the patients in the curable stage. Our medical practitioners on whom the responsibility of diagnosis lies in the first instance, should receive specialised training as part of their routine curriculum. Moreover, the patient should have opportunities of get-

ting specialised treatment near his home town and this can only be possible if there are cancer hospitals in the big cities and tumour clinics attached to general hospitals all over the country.

What of the future? Radiation has attained its maximum efficiency and nothing further can be expected in that direction.

It should be possible by suitable surgical procedures to expose the lesion so that it can be radiated directly without having to go through normal tissues. An attempt has been made in this direction in neoplasms of the Bladder. Rectum and the Stomach, so far, however, with inconclusive results.

Is atomic energy the answer to this great problem? One is apt to draw conclusions that the terrific release of energy from the break up of the atom can be utilised for the break up of malignant tissues. This is an obvious fallacy as such disruption must break up normal tissues as well. But from our point of view it can be utilised and is being utilised in a different direction. It is used for the preparation of radio-active isotopes. In the early days the Cyclotron was used in their preparation, but they could only produce small quantities. The atomic pile does so in large quantities and in a wider variety of substances. Such isotopes have proved very valuable as tracers in the study of metabolic processes and normal functions of the body. They have also been used for treatment of leukæmias, thyroid cancers and lymphomas.

I thank you. If what I have said has inspired confidence and enthusiasm about our speciality in you, if I have succeeded in establishing our relationship to our colleagues on basis of equality, I will look upon this as a satisfactory contribution to the cause of Radiology.

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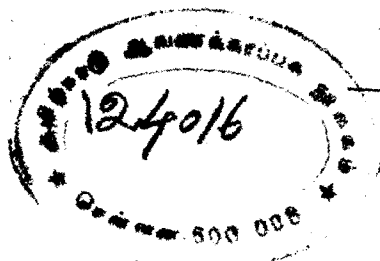
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List of Publications Received

- "Annals of the Rheumatic Diseases," June and Sept., 1947.
- "Archivio Di Radiologia," Nov., 1947.
- "British Journal of Radiology," Oct., Nov., Dec., 1947 and Jan., 1948.
- "Indian Journal of Medical Sciences," Jan., 1948.
- "Indian Journal of Venereal Diseases and Dermatology," Oct. and Dec., 1947.
- "International Medical Abstracts and Reviews," Nov. and Dec., 1947.
- "The Indian Physician," Nov. and Dec., 1947; Jan. and Feb., 1948.

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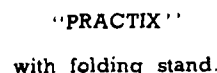
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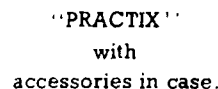
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