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Editorial

CANCER PROBLEM

Of the many scourges which exacts a heavy toll on human life, Cancer plays a major role. It is insidious in onset, relentless in its progress and fatal in its results unless it is detected sufficiently early and treated adequately and efficiently. In advanced countries like U. S. A. and U. K., it is a great killer next only to road or traffic accidents and cardiovascular disease. Even in our country the number of cases diagnosed is on the increase. Partly it may be due to improved methods of detection and partly due to the environmental factors consequent on rapid industrialisation. It is a disease which attacks the society irrespective of class of status in life even though certain occupations predisposes to incidence of malignant disease in particular system or organs.

In any organised campaign against Cancer the three major factors to be considered are:

(A) Cancer education of the public;

(B) Facilities for early scientific diagnosis and treatment; and

(C) Training of Cancer Specialists and workers.

While Cancerophobia should be avoided, awareness of Cancer or vigilance against Cancer must be instilled into minds of the common men and women. Through propaganda and education the citizens of this land should be made to understand that Cancer is completely curable if detected and treated eary while, if late it will only end fatally. It also should be brought home to them that there is no social stigma attached to the disease. By pamphlets, meetings and audiovisual apparatus as scientific news reels, radio and television devices, the citizens must be taught the early signs of cancer so that they can immediately seek and get expert advice and treatment. The elementary facts about Cancer and its early signs must be taught

to Students as part of their general Science curriculum along with physiology and hygiene. Frequent Cancer exhibitions (if possible travelling exhibitions) must be arranged in groups of villages. This Cancer education and anti-Cancer campaign in the public must be conducted by the Government sponsored anti-Cancer Societies in every district and Taluk in which Public leaders, medical specialists and social workers must be equally represented.

Next comes the facilities for early scientific diagnosis and adequate treatment of those patients who seek medical attention for Cancer. At every state capital there must be a State Cancer Board consisting of Specialists in Radiology, Surgery and Pathology to advise the State authorities. There must be training and research wings with adequate Laboratory facilities attached to each Cancer Hospital. The State must be divided into two or three regional centres and each centre must be provided with a Regional Cancer Hospital which must be fully equipped with Deep X-ray and Cobalt beam therapy apparatus, radium, pathology and biochemical laboratories. Three or four districts will be served by each Regional Cancer Hospital. Every district hospital must have provision for atleast 20 beds for Cancer patients with provision for Deep X-Ray Therapy and surgery. Peripheral Cancer Clinics must function in each Taluk Headquarters hospital. Thus with a Central authority and institute in the State capital with its tentacles extending to the villages efficient cancer detection and treatment can be organised for the whole State.

Lastly comes the training of Cancer Specialists, technicians and social workers in Cancer. Cancerology must form a separate branch in the undergraduate teaching. Patients first consult the general practitioner and they must be so trained that they must be able to spot very early malignant disease and refer the case to Taluk Cancer Clinic. Hence the importance of focusing Cancerology in the undergraduate curriculum. A Cancer Specialist must have a sound knowledge of the principles of tumor pathology, radiotherapy and cancer surgery since radiotherapy and surgery singly or in combination are the sheet-anchor in cancer treatment. Tumour pathology along with radiography form the basis of confirmation of malignant tumor. Atleast thrice a month in the final year of studies of the undergraduate there must be a symposium or a seminar on cancer of different situation in which the

radio-therapist, surgeon and pathologist should take active part. Post-graduate teaching on Cancerology must be conducted at the Central training institute in the metropolis where there must be full facilities for clinical studies as well as fundamental research. There must be full correlation between the various central training institutes in Cancerology in the country and there must be a common syllabus and uniform standard with post-graduate teaching. Well-staffed, efficient statistical and follow up departments must be attached to all these Cancer Training Centres. Training of technicians as well as social workers must be undertaken by the Central Training Institute as well as in Regional Cancer Hospitals.

Rehabilitation of cured Cancer patients as well as the care of advanced cases may be undertaken by the welfare associations in the districts. Liberal grants from the Central and State Governments as well as gifts from private national and international philanthropists and agencies will meet the requirements of this anti-cancer campaign and cancer treatment.

Thus a well organised effort with missionary zeal on the lines enumerated above is necessary to combat Cancer which is very insidious in onset, relentless in its progress and fatal in its result unless eradicated sufficiently early. In this campaign, radiologists as a major partner in the medical team for the diagnosis and cure of this menace, must play their part well in a crusading spirit.

A. N. K. Menon.

Intravenous Aortography

(A Preliminary Report)

BY

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The modern era of rapidly advancing vascular surgery requires more elaborate vascular Radiology with visualisation of the aorta and its main branches. Arteriography of various sites has been carried out by the injection of radio-opaque medium through a puncture of the vessel concerned. Dos-Santos et al, introduced the translumbar route for abdominal aortography which is widely practised these days.

Robb and Steinberg observed that during Angiocardiography abdominal aorta was often well visualised, especially in infants and short statured people. Bernstein et al, used this observation and carried out intravenous aortography using a mechanical injector, rapid cassette changer and radioactive isotopes for estimating the circulation time. Steinberg Finby et al, have further simplified this technique. Thus for the first time, it has become possible to visualise the abdominal aorta through the venous route.

In the department of Radiology, All-India Institute of Medical Sciences, New Delhi, it was decided to implement this intravenous method of abdominal aortography in its simplest form. To date we have carried out 35 such aortographies in patients of this hospital with such success that a preliminary report of our technique was warranted.

Technique

The patient is given a laxative the night before and arrives in the x-ray department, empty stomach. The patient is placed supine on the x-ray table equipped with a bucky grid. A preliminary scout film is taken to check the abdominal preparation as well as the radiographic technique. Both arms are then extended and veins are made prominent by the use of Sphygmomanometer Cuffs above the elbows. A 12 gauge needle (locally manufactured) mounted on a three way stop-cock is attached to a 50 cc. syringe filled with a normal saline. One such needle is then inserted percutaneously into the antecubital veins of each arm after infiltrating the skin with 2 per cent lignocaine. It may be necessary to resort to venesection in the absence of a large vein. The sphygmomanometer cuffs are then deflated and a few ccs. of the saline are injected to check the position of the needle. The needles are then secured in place by adhesive tapes and the syringes are detached after closing the stop cock.

Circulation time is then determined. 3 cc. of Decholin is taken in a 50 cc. syringe and diluted upto 18 cc. with normal Saline. The patient is instructed to anticipate bitter taste and to put out his tongue as soon as he feels it. The Decholin solution is then quickly injected and the time noted by a stop watch from the start of injection to the

patient's protruding of the tongue. This preliminary study is also a rehearsal for the patient so that he can hold his breath at the time of X-ray exposure. The exposure for the aortography film is to be started 2 secs. before this estimated arm to tongue circulation time. The patient is also versed that he would feel a wave of intense heat with the injection of the dye and assured that this would quickly pass off.

A dose of 1 cc. per Kg. body weight of the contrast medium is then taken in two Robb syringes and these are connected to the needles. The arms of the patient are then elevated. Two operators then rapidly and simultaneously inject the dye. This is usually accomplished within two seconds. The patients is asked to hold his breath before starting the exposure. A roentgen exposure lasting 2·5 seconds is then made using 50 ma. 100 cms. F. F. D. The KV is varied according to size of the patient. A second abdominal film is obtained immediately afterwards to obtain the Nephrographic phase. The cassette being manually changed by a technician. If a peripheral arteriogram is also required a portable unit is prefixed in place and exposed immediately after the first exposure. The needles are kept in place while the wet films are being reviewed. The injection may be repeated if necessary after rechecking the circulation time. Otherwise the needles are removed and tight bandages are applied. After ten or fifteen minutes an IVP film may be taken if necessary.

Contrast Medium

Steinberg et al have used 90% Hypaque or Cardiografin as these compounds have high iodine content. Since these products were not available in India we have used 76% Urograffin or 70% Diaginol in our earlier studies. Later on, we were able to obtain 90% Hypaque and Cardiografin and we have used these in our later series. It is too early yet to compare the results of the four media. However, we may be in a position to report on this at a later date.

Results

Thirty five patients have been studied by Intravenous Aortography upto 1-2-61 with no serious complications.

There were eight failures. The causes of failure were probably due to mistimed exposure, inability to inject the entire amount of the dye and unco-operative patient. Thus studies of diagnostic quality were obtained in twenty seven cases.

Out of these 27 successful aortograms twenty-one were carried out for various renal lesions. It was felt that a more accurate diagnosis of renal lesions might be possible with this study. In these cases both the early arterial as well as the nephrographic phase were of value. Nephrograms were obtained in all the cases. Aorta and its main branches were well seen in nineteen cases. The faint opacification of the aorta and its main branches in two cases was due to slow injection of the dye. On nephrography it is possible to recognise areas of avascular renal parenchyma such as occurs in cysts and occasional neoplasm.

Some of the illustrative cases are shown below :—

Fig. 1.—K. L. This 45 years old male presented with a right renal mass. Intravenous Pyelogram shows distended and distorted major calyces displaced to the upper pole by a renal mass. Normal renal tissue is probably present in the upper pole only. Left kidney is normal.

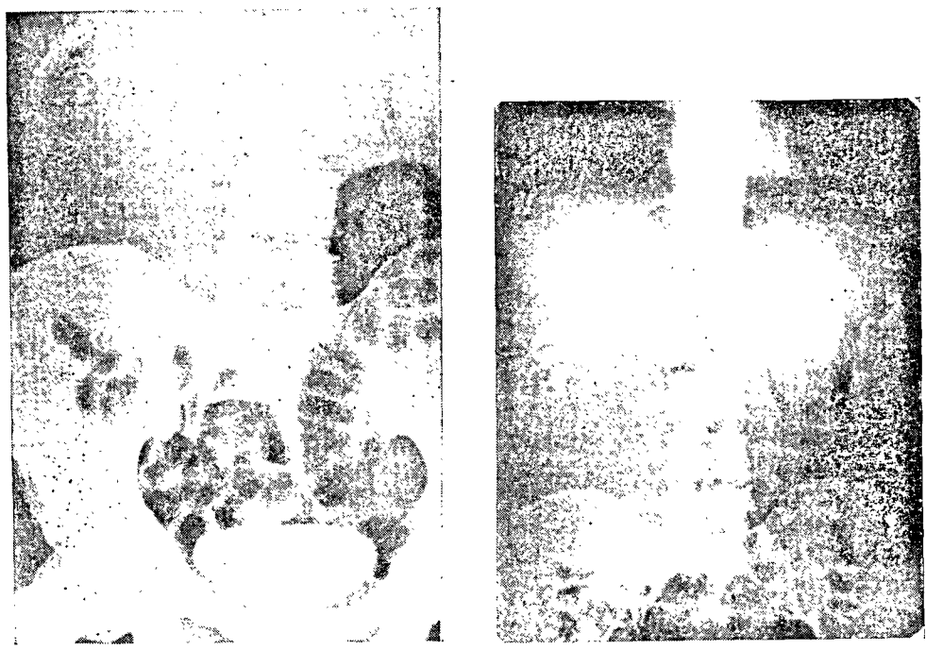

Fig. 1

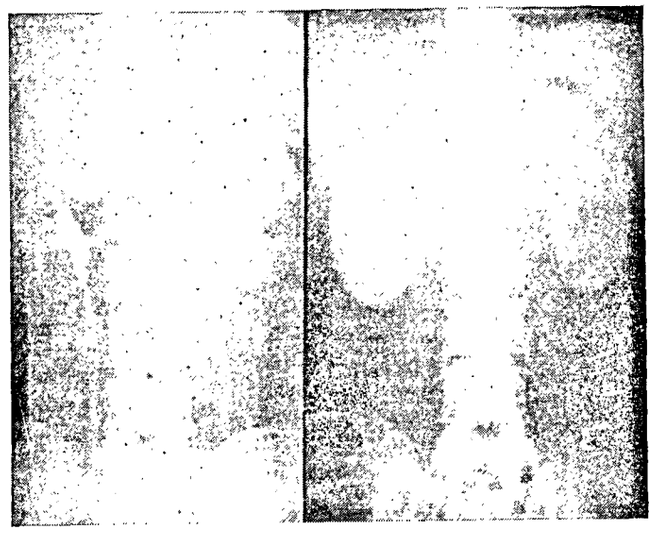

Fig. 2

Intravenous Aortograms.–Aorta and its main branches are well visualised. Aorta is displaced to the left side at the level of second to fifth lumbar vertebrae. The left renal artery is normal. The right renal artery is pushed upwards. Only superior branch is seen in its entirety. The two lower branches are obliterated soon after their origin. The mass itself is avascular. The radiological diagnosis of hypernephroma was confirmed at operation.

Fig. 2.—S. S. This 27 years old male patient complained of pain in the left loin occasionally radiating to the groin.

Intravenous Pyelogram shows hydronephrosis on the left side. There is a sudden narrowing of the ureter just below the pelviureteral junction. The right side is normal.

Intravenous Aortogram demonstrates an aberrant renal artery arising from the aorta and going towards the hilum of the left kidney. This is crossing the ureter at the site of above mentioned obstruction. At operation the aberrant artery was ligated and a partial nephrectomy was performed.

Fig. 3.—P. S. This 14 years old boy complained of Colicky pain in the left loin since 3-4 years, radiating to the waist and back.

Intravenous Pyelogram shows hydronephrosis on the left side. On intravenous aortography there is good visualization of the aorta and its main branches. Renal artery branches are also seen. There is an aberrant renal artery on the left side arising 2" below the renal artery. This is crossing the ureter at the site of obstruction already noted.

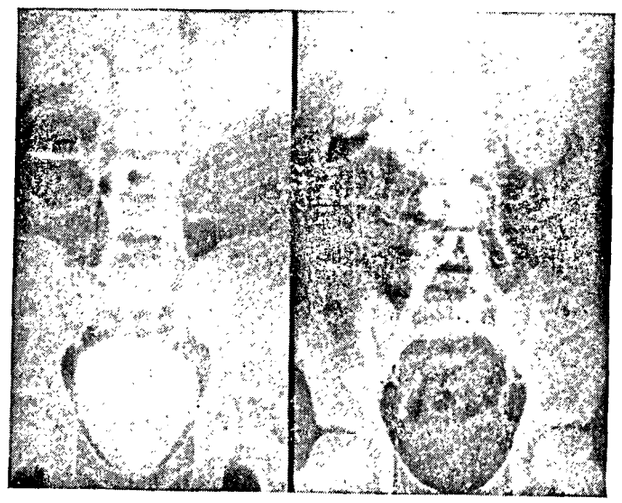

Fig. 3

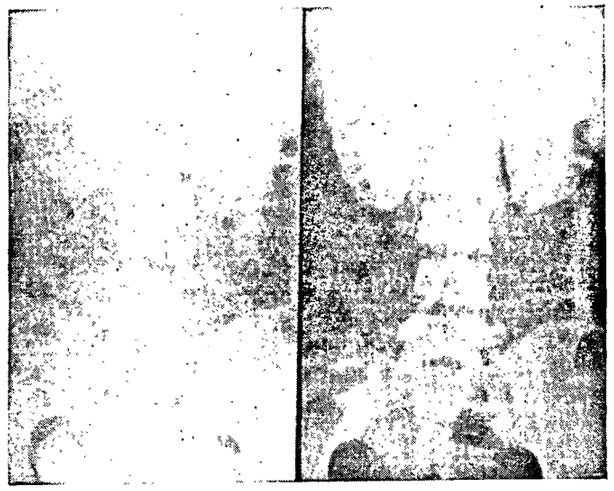

Fig. 4

Fig. 4.—S. D. This 22 years old female had pain in the right lumbar region.

Intravenous Pyelogram shows bilateral hydronephrosis with sudden narrowing at the pelvi ureteral junctions. Aortography does not reveal any aberrant arteries. Evidently the cause of bilateral hydronephrosis is probably congenital.

Fig. 5.—P. This 32 years old woman was a case of long standing renal disease. She had been passing albumin and casts in urine. Plain skiagram and intravenous pyelogram revealed bilateral foetal lobulations of the kidney.

Intravenons aortography was performed in order to see whether the renal arteries were single or multiple. Single renal arteries are seen on either side.

Fig. 5

Fig. 6.—H. D. This 30 years old male patient presented with pain in the abdomen, dimness of vision, and a pulsatile mass in the left hypochondrium.

Intravenous Pyelogram shows a poorly functioning right kidney.

Intravenous aortogram demonstrates an aneurysmal dilatation of the thoraco-abdominal aorta with partial or complete occlusion of the coeliac axis and right renal artery. The left renal artery shows aneurysmal dilatation from its origin to the hilum of the kidney. These findings have been confirmed at autopsy.

Fig. 7.—A. This 40 years old male presented with progressive intermittent claudications of the left leg. There was some wasting of this extremity.

Intravenous arteriogram demonstrates a block of the left external iliac artery near its origin with marked collateral circulation on the left side of the pelvis.

Fig. 6

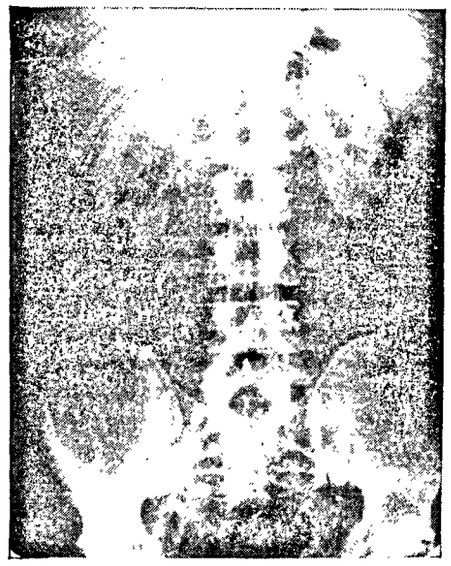

Fig. 7

Discussion

Translumbar Aortography for the visualisation of the abdominal aorta and its branches is still the most widely employed technique. However, extensive use of this direct puncture of the aorta has brought to light numerous serious complications. These include renal insufficiency, anuria, haemorrhage, haematoma formation, dissection of vessel wall, superior mesenteric artery thrombosis, paraplegia, pancreatitis, adrenal insufficiency and some-times even death. Recently McAfee and Wilson reviewed 12,832 translumbar aortographies and found an incidence of 1·02% serious complications, with a mortality of 0·28 per cent. This explains the reluctance on the part of the physicians to use this method. Moreover the performance of the procedure under general anaesthesia further adds to the hazards. A technique of complete asepsis must be maintained and this involves a large number of trained personnel.

The complications of retrograde method of aortography are similarly many. It causes a direct trauma to the vessel wall which often leads to local thrombosis. Occasionally dissection of vessel wall may result by this procedure.

The visualisation of the abdominal aorta by the venous route thus promises great safety and many advantages. It eliminates the necessity for general anaesthesia and the hazards of direct and blind arterial wall puncture. The greatest advantage of this method is its simplicity. It can be carried out in any department doing routine radiography. The procedure can be performed by two operators who inject the dye, one Radiologist and a technician. The hazards of Radiation to the patient are minimal as compared to the method using rapid cassette changer, as the number of films taken are few. Radiation to the personnel is minimised by suitable coning of the x-ray beam and further-more they can move to a protected area after the completion of the injection, as there is sufficient time between this and the first x-ray exposure.

Surgical excision of the aortic aneurysms and replacement by grafts are being practiced in greater numbers and therefore visualisation of these is no longer of academic interest only. Intravenous aortography can be used not only to diagnose these lesions but also to study the results and benefits of surgery.

The greatest value of this method lies in the accurate diagnosis of some of the renal lesions. In these cases both the arterial as well as the nephrographic phases are of value. Recognition of areas of non-functioning or mal-functioning renal parenchyma as occur in cysts and neoplasms on nephrography is the most important contribution. The visualisation of the arterial pattern of the kidney is helpful to the surgeon in planning a partial nephrectomy. Cases of aberrant renal artery giving rise to hydronephrosis may be diagnosed and successfully treated.

Renal arteriography is coming to light in the investigation of un-explained hypertension which might show as a thrombosis or narrowing of a renal artery. Such patients have received surgical benefit by nephrectomy. Thus intravenous aortography may in future be used routinely in investigating every hypertensive patient, of suspected renal origin.

With this technique, the splenic and the hepatic arteries are also visualised and thus lesions of these vessels may be discovered. Bosniak and Byck were able to diagnose a case of wandering spleen by this method.

Steinberg and Churl have recommended that this study can be utilised safely as an emergency procedure. They report of having diagnosed a case of ruptured spleen by this emergency intravenous aortography. The peripheral vascular tree of the lower extremity can also be well visualised by this technique.

The serious complications of this procedure are rare. We have had no serious complications. Occasionally patients complained of headache, nausea and vomiting. Thrombophlebitis has not been common. There are very few contraindications to this procedure.

Summary

A safe and practical intravenous method of abdominal and peripheral aortography carried out in 35 patients is described. This method has great advantages over the widely used direct arterial puncture methods. The indications of this procedure are discussed. There were no serious complications from this procedure.

Acknowledgements

We are grateful to the Director for his constant encouragement and permission to publish this work. Our thanks are also due to our surgical colleagues for the selection of the cases, their preparation and carrying out the procedure in the Radiology Department. We sincerely appreciate the co-operation extended to us by the staff of Radiology Department.

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Atresias of Alimentary Tract

BY

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AND

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With increasing success of surgical methods in treating congenital atresias of alimentary tract, it is incumbent upon the radiologists to make an early and accurate diagnosis of this condition. Pediatric radiology has not lagged behind in this respect. It is the purpose of this paper to discuss the common and easily recognizable findings in such types of cases.

Durston in 1670, reported the first case of oesophageal atresia with tracheo-oesophageal fistula. In 1884, Mackenzie going back to 1670, collected 62 cases of congenital atresia of oesophagus and reported one of his own. Vogt in 1929 offered the first attempt at classification of tracheo-oesophageal fistulas with oesophageal atresia.

Vogt's classification—

Type I—Complete absence of oesophagus (very rare).

Type II—Atresia of oesophagus with separate upper and lower segments, each ending in a blind pouch.

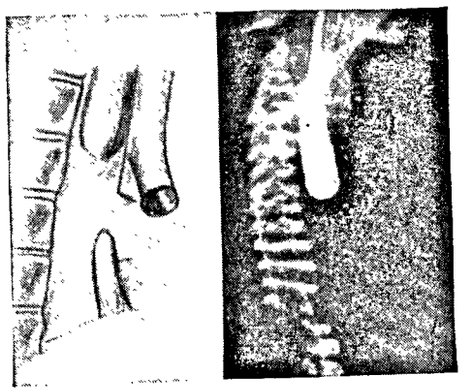
Type III—Atresia of oesophagus with a tracheo-oesophageal fistula of various types (Plates 1, 2, 3 and 4).

Congenital atresia of the intestinal tract is relatively a rare anomaly. Webb and Wangensteen estimate that it occurs once in 20,000 births. Evans on the other hand considers it to be more frequent, stating that it occurs once in 1,500 births. The entity has been recognised for many years, the earliest reported case according to Evans being that of Binninger who is said to have seen an atresia of colon in 1673.

The incidence of intestinal atresia in colon is variously quoted ranging from 5 to 17 per cent of total number of cases of congenital intestinal obstruction. Multiple atresias occur in 13 to 19 per cent of cases. The familial incidence of congenital intestinal obstruction is mentioned by Cohen.

According to Ladd and Gross, atresia of the intestine may assume one of two forms, (1) a blind ending of the intestine giving discontinuity (this may be multiple) and (2) complete blocking of the lumen with septum.

Imperforate anus is the commonest type of atresia met with. Malformation of the anus and rectum are said to occur about once in 5,000 births. They may occur as an atresia alone or may be associated with fistulous communication with the urogenital system. Pure atresia may be of low or high type, depending upon the length of the segment involved.



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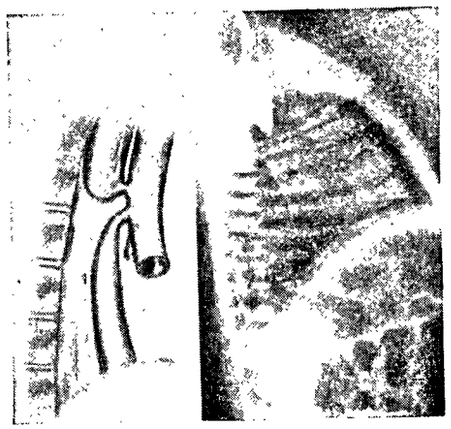


Fig. 2

Clinical Material

Type of atresia		No. of cases
Oesophageal	...	19
Duodenal	...	1
Jejunal	...	1
Ileal	...	1
Colonic	...	1
Imperforate anus	...	20
Multiple	...	2

Nineteen cases of oesophageal atresia were studied at the K. E. M. Hospital and Bai Jerbai Wadia Hospital for Children Bombay.

		No. of cases
Type I	...	0
Type II	...	3 (Plate I
Type III	...	16 (Plates 2, 3 & 4

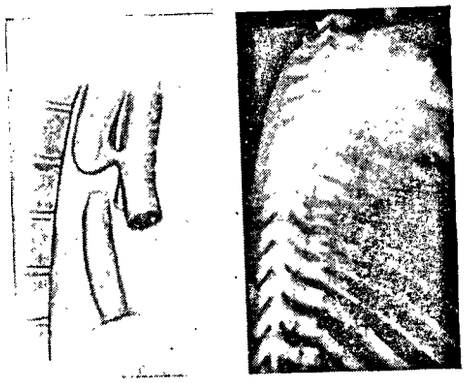
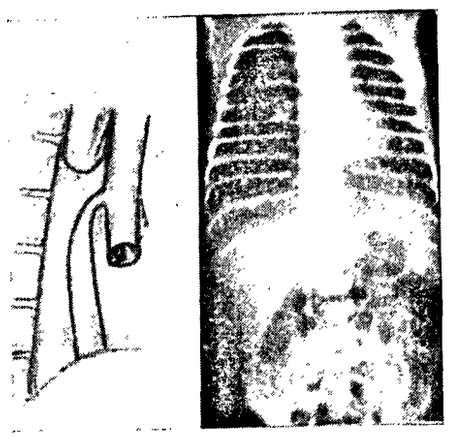


Fig. 3



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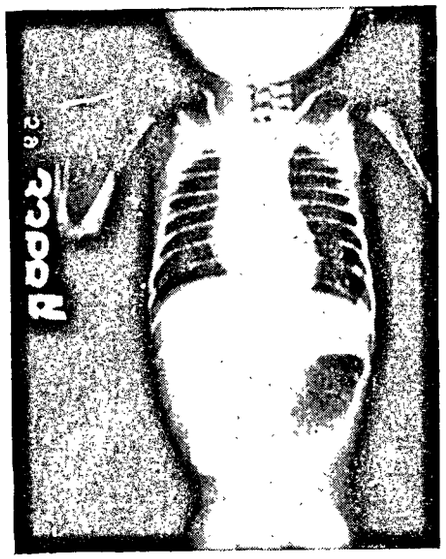

Fig. 5

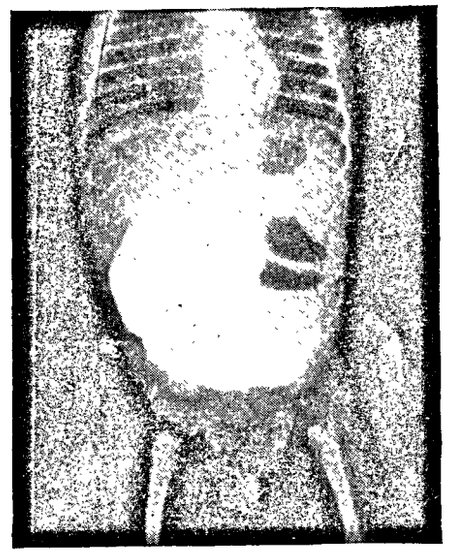

Fig. 6

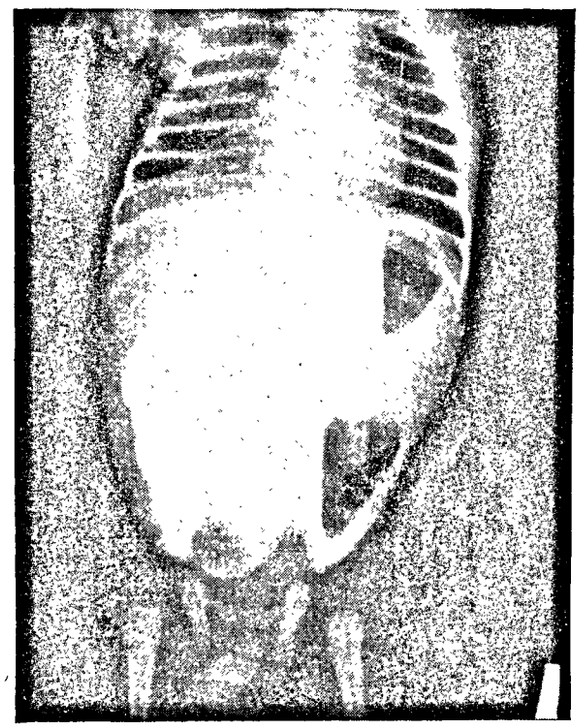

Fig. 7

Fig. 8

For demonstration of atresia and tracheo-oesophageal fistula lipoidol or dionosil was used so that spilling into bronchial tree is harmless. In most of the cases the type of atresia was confirmed at autopsy.

Duodenal atresia (1): This is comparatively rare but easy to diagnose, if the condition is borne in mind. The plain skiagram shows the distended duodenal bulb with absence of air lower down (Plate 5).

Jejunal atresia (1): Vomiting and distension in a 3-day old infant. The obstruction was demonstrated by using a fluid contrast medium-iodetol. The child was operated upon and the diagnosis confirmed (Plates 6-7).

Ileal atresia: An infant was admitted with history of vomiting and distension of abdomen starting on second day after birth. On 4th day after birth, the x-ray showed fluid level in small intestine. Lipoidol enema demonstrated microcolon. The patient was operated upon and atresia of terminal ileum was confirmed. Colon was normal (Plate 8).

Colonic atresia: An infant was admitted on 3rd day after birth, with the clinical manifestations of intestinal obstruction. There was no imperforate anus and dionosil enema showed microcolon caecostomy was performed. Four weeks after the operation dionosil enema showed microcolon with bulbous ending of the transverse colon near the hepatic flexure. This represented the segment distal to the atresia. Simultaneous fistulogram through caecostomy opening showed membranous septum in the transverse colon. The child died of gastro-enteritis four days after these investigations and autopsy showed membranous septum at the previously mentioned site (Plates 9, 10, 11).

Fig. 9

Fig. 10

Fig. 11

Fig. 12

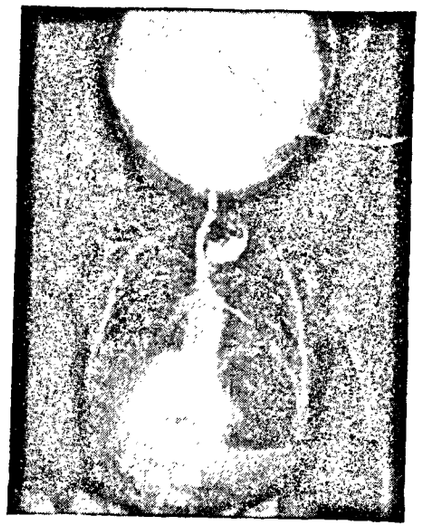

Fig 13

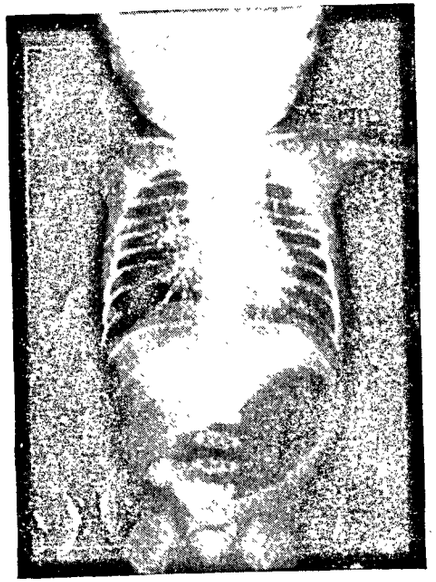

Fig. 14

Fig. 15

Fig. 16

Fig 17

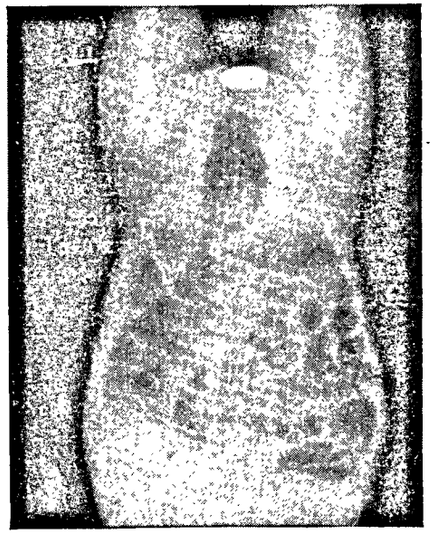

Fig. 18

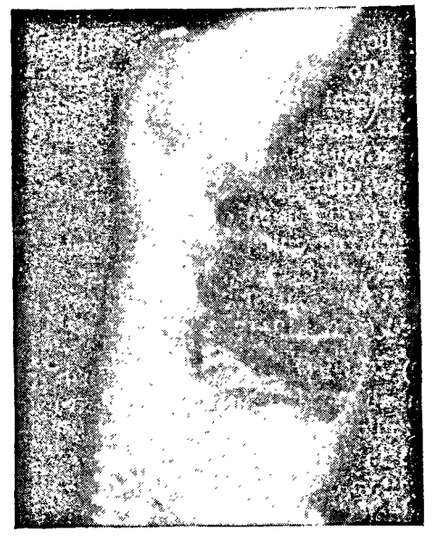

Fig. 19

Fig. 20

Fig. 21

Multiple atresias (1) : Oesophageal and duodenal atresia with imperforate anus. A new born was admitted for imperforate anus. To rule out commonly associated oesophageal and other types of atresia, further investigations were carried out. The X-ray shows type III oesophageal atresia with tracheo-oesophageal fistula. There is distension of duodenal bulb and stomach suggesting duodenal atresia. The patient was operated but did not survive and at autopsy all the atresias were confirmed (Plates 12, 13, 14).

(2) *Ileal and colonic atresia* : In a new born admitted for intestinal obstruction, the radiological examination showed fluid levels in intestinal coils and microcolon, suggestive of intestinal atresia. At autopsy terminal ileum and ascending colon were found atresic (Plates 15, 16, 17).

Imperforate anus		20 cases.
Low type	...	16 cases (Plates 18 & 19).
High type	...	3 cases (Plate 20).
With fistula	...	1 case (Plate 21).

The radiological diagnosis does not offer great difficulty but the small indications of the presence of these conditions are likely to pass un-noticed, as for example the dilated bulb in duodenal atresia.

Summary

The presence of multiple atresic lesions requires to be borne in mind in dealing with intestinal obstruction in children. Accurate localisation of the site of the obstructing lesion has become a matter of importance as surgery has advanced.

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Intestinal Pneumatosis with Pyloric Stenosis Due to Membrane

BY

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AND

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Discussion on Intestinal Pneumatosis

Most of the reports in the literature are those of isolated cases. Koss[10] made an extensive review of the literature and collected 213 cases in *adults*. He also collected *31 cases in children*. Further cases in children have been reported by several authors [5, 13, 14, 16] but most of the reported cases have been in adults.

John Hunter was first to describe this disease in humans. Many of the first descriptions were found in the veterinary literature as the disease is common in hogs. The first well documented case was published by Bangs[4].

The preoperative diagnosis of pneumatosis intestinalis was made possible from the X-Ray findings described by Lerner and Gazin[12].

In our cases the preoperative diagnosis was possible as the straight X-Ray of the chest showed interposition of the loops of bowel with multiple cysts between the liver and diaphragm. This is due to buoyancy of the gas filled bowel. Ba-meal demonstrated multiple radiolucent defects where the cysts encroached on the lumen of the bowel; due to pyloric stenosis enough barium did not leave the stomach and it took 72 hours to outline the small intestine satisfactorily.

At operation the whole of small bowel was studded with subserous cysts. These cysts were situated in the wall of the small gut and in mesentery. The loops of small bowel studded with gas cysts were interposed between the liver and the right diaphragm.

The pneumatosis cystoides is usually harmless in adults, but obstruction of the gastro-intestinal tract is main presenting complaint. Koss analysed the published case and reported in 58 percent of the reported cases obstruction of the pylorus due to peptic ulcer was the leading disease. In our first case obstruction of the pylorus was due to congenital diaphragm situated at the pylorus and in the second case the obstruction was due to cicatrisation following duodenal ulceration.

The cysts can burst and give rise to pneumoperitoneum. Obstruction of the small gut due to extrinsic pressure by cysts has also been reported.

In children, the cysts are usually situated in the subserous and the disease is invariably fatal.

The Pathogenesis of the disease is not clear. There are advocates for the neoplastic, nutritional, chemical, bacterial and mechanical theory.

Discussion on Adult Pyloric Stenosis due to Membrane

Of the various causes of pyloric stenosis due to intrinsic diseases of the stomach, obstruction due to mucosal diaphragm is one of the rarest. There are only 8 cases reported in the world literature.

The mucosal diaphragm as described in the first case is probably congenital in origin. It has to be distinguished from redundant mucosa in hypertrophic stenosis. In our case there was no obvious cause of obstruction, on the external examination of the pylorus and duodenum, at laparotomy. The stomach was tremendously enlarged, due to longstanding obstruction at the pyloric level as seen in the preoperative barium meal studies. We were at first at a loss to explain the condition, we considered the possibility of redundant gastric mucosa prolapsing into the pylorus and the possibility of obstruction due to mucosal diaphragm.

It was decided to open the stomach about 3·5 cms. proximal to the pylorus.

On examining the gastric aspect of the pylorus and invaginating the finger from the duodenal side the cause of the obstruction was quite clear. There was a mucosal diaphragm situated at the pyloric level, with a small hole in the centre which admitted a tip of Halsteads artery forceps. It was impossible to introduce an index finger through this hole in the membrane, though the membrane felt soft and pliable. The mucosal diaphragm may be situated at the pylorus as in our case or it may be situated proximal to pylorus. Sames (1949) described a diaphragm situated 1·5 cms. proximal to the pyloric ring. Rota (1953) described a case of pyloric obstruction due to diaphragm. At operation no ulcer was found in stomach or duodenum. Barium meal before operation showed a large stomach with no obvious cause of obstruction.

Passalacqua and Romero (1955) reported a case of pyloric obstruction due to mucosal diaphragm. They considered the mucosal diaphragm to be congenital in origin.

Rhind (1959) in discussing the aetiology, considered the condition to be an end result of scarring of a superficial pyloric ulcer.

Chamberlain and Addison (1959) have described two cases of adult pyloric obstruction due to soft mucosal diaphragm.

Case No. 1

A female patient aged 23 years was admitted to the hospital with a history of indigestion, vomiting and pain in the abdomen for last 6 years. The history of repeated vomiting and movement of a mass in the abdomen after food suggested pyloric stenosis. She is releived of her pain after vomiting.

On examination she is of a thin built and anaemic. Cardio-Vascular System-B.P. 92/60. Heart-N.A.D.

Respiratory System—Diminished breath sounds with crepitations at the bases of both lung fields.

Haematological Investigations showed macrocytic Hypochromic type of anaemia (HB 10 Gms%).

Stool showed—Ova of Hook worm.

Fractional Test Meal showed high total acid with delayed emptying.

Straight X-Ray of Chest (Fig. 1)

Lung fields normal. There is hilar congestion at both hila. There are few cysts present below the right done of the diaphragm, interposed in between the right diaphragm and Liver.

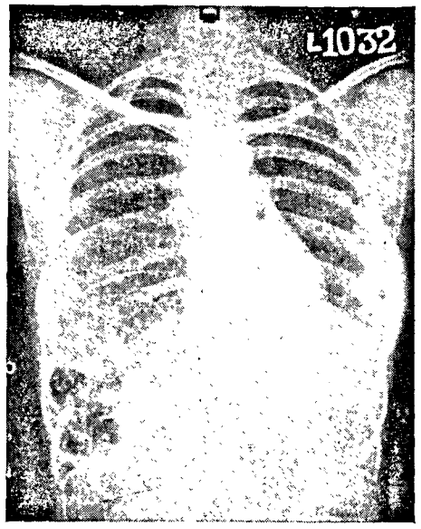

Fig. 1
Chest X-Ray of Case-1.

Barium Meal Studies (Fig. 2 & 3)

Oesophagus normal. Large hypotonic stomach lying in the pelvic cavity with well formed duodenal cap. Barium meal was retained in the stomach till 72 hours. Small intestine shows multiple round filling defects presumable due to air cysts. The loops of small bowel are interposed between the liver and the diaphragm. The cause of the pyloric stenosis could not be ascertained. Large Intestine shows cystic filling defects too.

Bronchography Examination

The cystic bronchiectasis was elicited in the left lower lobe of the lung field.

Operative Notes

Laparotomy (*B. S. D.*)—At operation it was found that loops of bowel were interposed between the liver and the diaphragm.

Fig. 2
Barium Meal X-Ray of Stomach.

Fig. 3
Barium Meal X-Ray of Stomach after 72 hours.

These loops of bowel contained multiple air cysts.

The stomach was markedly distended and filled up most of the abdominal cavity. On careful palpation and inspection the cause of obstruction of the pylorus could not be ascertained. The stomach was opened about 3·5 cms. proximal to pylorus and inspection through this opening revealed a mucosal diaphragm situated at the pylorus, through which tip of Halsteads artery forceps could be passed with difficulty. The mucosal diaphragm was divided and pyloroplasty carried out.

Biopsy Report.—Gas cysts of bowel.

Case No. 2

A male patient aged 40 years was admitted to the hospital with a history of indigestion and epigastric pain for the past 10 years and the history of repeated vomiting for the past 2 years. He was known to have duodenal ulcer for the past 10 years and the recent episodes of vomiting suggested that he has pyloric stenosis.

On examination he was emaciated (weight 87 lbs.) there was Oedema of the feet and free peritoneal fluid.

Cardio Vascular System.—Heart N. A. D. B. P. 110/40.

Haematological investigation showed macrocytic Hypochromic type of anaemia (H. B.: 11·5 G%).

Stools showed ankylostoma duodenal.

Straight X-Ray of Chest showed " Lung fields normal. There are loops of small bowel interposed between the right diaphragm and the liver. There are number of air cysts present at these loops of bowel (Fig. 4).

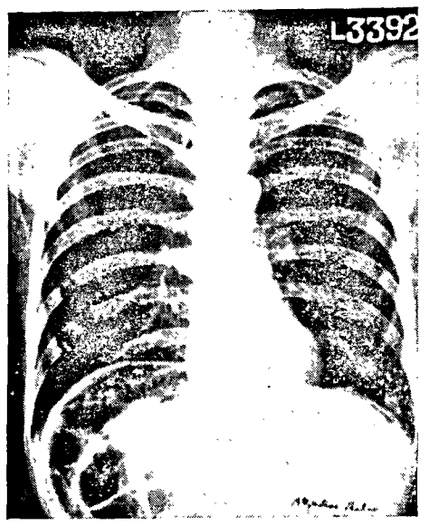

Fig. 4

Chest X-Ray of Case–2.

Barium Meal Studies.–Oesophagus normal. There is a very large hypotonic stomach sinking into the pelvis. Nearly half the Barium meal was still retained in the stomach at the end of 24 hours: There is a marked narrowing of the proximal duodenum resulting from an old standing duodenal ulcer (Fig. 5 & 6).

The small intestine shows multiple round filling defects, presumably due to the air cysts. The loops of small bowel are interposed between the liver and the diaphragm.

Preoperative preparation.—He was given 1500 cc. of blood to correct anaemia and appropriate electrolyte infusion to correct the marked electrolytic imbalance.

Operation.—Partial gastrectomy (B. S. D.) was carried out. At operation it was found that there was posterior duodenal ulcer which had penetrated the pancreas. There was marked narrowing of the duodenum.

Fig. 5

Barium Meal X-Ray of Stomach.

Most of the small intestine and the mesentery contained typical air cysts. Liver Biopsy was performed and abdomen closed.

Post-Operative progress was satisfactory.

Biopsy Report.—Specimen - Liver and pyloric end of stomach. Impression - Healed chronic gastric ulcer with epthelisation. Chronic Lymphadenitis.

Summary

Two cases of pneumatosis Intestinalis with pyloric obstruction are described. In the first case the pyloric obstruction was produced by soft mucosal diaphragm and in the second case the pyloric obstruction was due to duodenal ulcer.

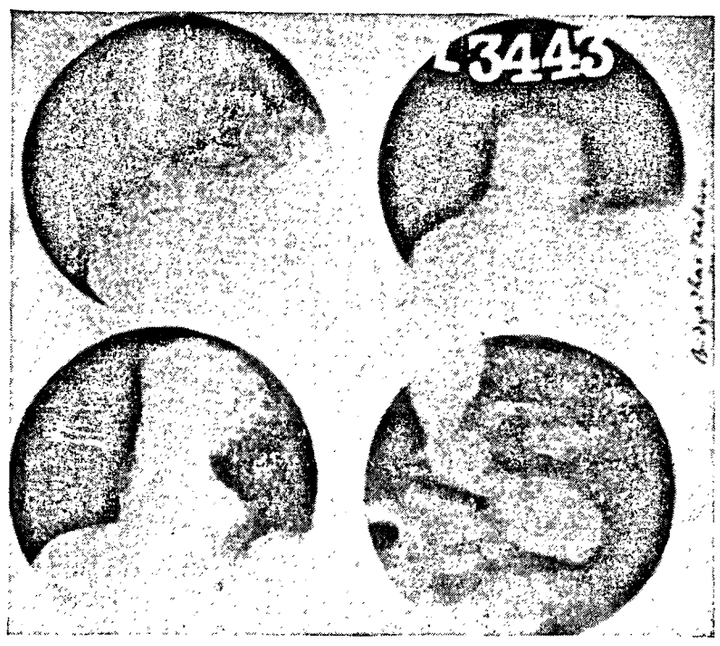

Fig. 6

Barium Meal X-Ray of a part of Duodenum and small Intestine.

There are only eight cases described in the world literature where the pyloric obstruction was produced by soft mucosal diaphragm. As far we are aware this is the first case, where pneumatosis intestinalis and mucosal diaphragm at pylorous ever found in the same patient.

Acknowledgement

We are grateful to the Pathologists of Christian Medical College, Vellore for carrying out histological examination on the cysts.

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Pneumopolycysts are seen in Carvix, Vagina, Vulva, G. I. T., Urinary Tract.

Gaucher's Disease

BY

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A case report—Clinical diagnosis by radiography with confirmation by sternal marrow examination

The disease was first described by Gaucher in 1882.[1] It is an uncommon familial malady in which there is an abnormal accumulation of large amounts of the cerebroside kerasin—a lipoid—in the reticulo-endothelial cells of the spleen, the liver, the lymph nodes and the bone marrow. The number of recorded cases is still not large; perusal through the literature indicates that only approximately 250 cases have been described till 1951 (Carl Reich et al[2]).

It is said that Gaucher's disease generally presents a picture in which hepatosplenomegaly predominates, although a variability in its age of onset, rate of progress of the disease and the organs affected is known to occur, the usual functional disturbance in most reported cases being increasing abdominal distension due to enlargement of the spleen and liver.

Skeletal infiltration in this disease was first noted by Mandelbaum and Libman in 1905.[3] It is known that such infiltration may cause absorption of bone and spontaneous fracture; this sometimes may be the first clinical sign. The following case is worth recording, for the chief complaint was his knock knee in otherwise normal patient.

It is not out of place to mention that the first case of Gaucher's disease was described from India by Spackman and Mackie in 1925, being diagnosed purely on clinical findings. The first authentic case from India diagnosed by spleen puncture was reported by Prof. D. G. Reddy and V. C. Anguli in 1952 from Madras Medical College. This is a second authentic case from Madras.

Case Report

A Hindu boy aged about 18 years reported to a Surgical Consultant for his knock knee deformity. He had no other complaint. Physical examination showed the following features.

He was well built, but rather short for his age and expected normal stature. His eyes were myopic. There was no other abnormality except the knock knee deformity. Liver and spleen were not palpable on three examinations during the course of one year.

for kerasin. These are possible surmises opening up new avenues for histo chemical research.

Summary

1. A case of Gaucher's disease confirmed by sternal marrow examination is reported.

2. The predominant changes were skeletal. There was no clinical evidence of hepato splenomegaly.

3. The patient could not be followed up since he resorted to homoeopathic system of treatment.

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SUPPLEMENT

Radiation Protection in Diagnostic X-Ray Departments of District Hospitals

BY

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Introduction

The purpose of this article is to discuss some aspects of radiation protection in Diagnostic X-ray departments of District Hospitals and other small hospitals. These hospitals are perhaps, at present, not provided with all the desiderata for X-ray protection and an attempt will be made to discuss what use can be made, in the meantime, of equipment readily available or easily procurable.

The Hazards of Radiation

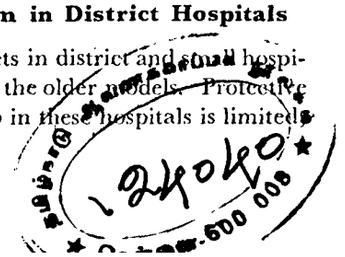
The dangers to man of ionising radiations are well known. The hazard is a dual one—the somatic and the genetic. Among the possible somatic effects of radiation are the carcinogenic and leukaemogenic effects, the shortening of the life span, the production of leucopenia and aplastic anaemia and the effects on the skin and its appendages. What is perhaps of greater concern is the hazard to the race. Ionizing radiations are capable of producing gene mutation. There is no threshold of radiation dosage below which such genetic damage cannot occur. Further, the mutagenic effects of radiation are cumulative. There is no recovery, unlike in the case of somatic effects where fractionation of dose permits some recovery. The mutations produced are no different from the naturally occurring ones and are nearly always detrimental. Stevenson (1959), mentions 142 diseases or abnormalities which are expressions of single mutant genes, whose incidence in the population is directly proportional to the mutation rates (cited by Carter, 1960). The genetic danger is greatest in the young but, of course, exists throughout the reproductive period. Gene mutation can be produced only by radiation reaching the gonads.

Awareness of the Hazard

The consciousness of this hazard should be uppermost in the minds of all those who use ionizing radiations. The number of such individuals in our country is growing, with the increasing use of X-rays and of radio-isotopes. The number of patients who are subjected to X-ray examination is increasing *pari passu*. Many of these patients are men and women in the prime of life and there is also a substantial proportion of children. Radiation exposure to large numbers of the population would naturally enhance the possibility of detrimental effects being produced in future generations by mutated genes. It behoves us to eliminate unnecessary radiation to patients when carrying out a diagnostic X-ray examination and perhaps also to question ourselves as to the necessity of an X-ray examination in each case.

The Problem in District Hospitals

The X-ray sets in district and small hospitals are usually the older models. Protective equipment also in these hospitals is limited



though lead rubber gloves and aprons are invariably provided. Till adequate protective equipment becomes available in our smaller hospitals, or till the old X-ray sets are replaced by modern ones as the case may be, efforts must be made to achieve as much patient and personnel protection as is possible with the equipment at hand. It is proposed to describe various methods to achieve this end.

Protection of Patient and Staff

There are two aspects of radiation exposure against which protection must be afforded—exposure of the patient and exposure of the staff. Any measures taken to reduce the dosage to the patient will automatically reduce the dosage to the staff.

Protection of the Patient: General Remarks

The radiation dosage to the patient can be reduced by attention to such factors as the limitation of the beam, the use of fresh X-ray films and, if possible, the provision of adequate tube filtration.

(a) *Limitation of the beam.*—The older diagnostic X-ray sets in most district hospitals are usually not fitted with light beam diaphragms. Many of these are also not provided with cones of sufficient number and variety to limit the beam to the area of interest. Often, therefore, a short cone with wide coverage is used for almost all X-ray examinations. When in a hurry, it is noticed that the operator sometimes omits the use of a cone altogether in order to save the time that would be required for accurate centering. Such a practice must be strongly condemned. It is especially when radiography is carried out with the tube at a distance from the subject (*e.g.* chest or lateral cervical spine at 6 ft. distance, and when, as has been observed, either no cone is used or a very short one that there is unnecessary irradiation of large areas of the body. It should be the rule that a cone as near as possible to the size required should be used. For the X-ray examination where the appropriate cone is available, the radiologist should insist on seeing the line of cut out on the X-ray film (Stanford, 1957).

(b) *Storage of X-Ray films.*—Facilities for air conditioned rooms for storage of X-ray films are practically non-existent in district hospitals. With high summer temperatures and monsoon humidity, X-ray films will deteriorate if stored even for short periods. Such defective films will result in further exposure of the patient in attempts to produce a satisfactory film. It is advisable that only the smallest stock of films should be kept and arrangements made for frequent replenishment. The films should be used in the order in which they are received.

(c) *Tube filtration.*—A fair proportion of the X-ray beam at conventional kilovoltages consists of soft radiation which is absorbed by the patient's tissues and never reaches the film. This contribution to patient dosage can be reduced by the use of an additional filter of aluminium (Stanford, 1957). If such a filter could be added to the older sets in district hospitals which usually do not have sufficient inherent and added filtration, and if a higher kilovoltage could then be used, much reduction in patient dosage could be achieved (Binks, 1955).

Protection of the patient in various X-ray examinations

(a) *Chest Radiography.*—Since the largest number of requests in an X-ray department is for a film of the chest, it may be appropriate to go into some detail here. (Fig. 1) shows the usual set up when using an older machine fitted with the short cone that is often used. A second film was placed experimentally in the position shown. On giving

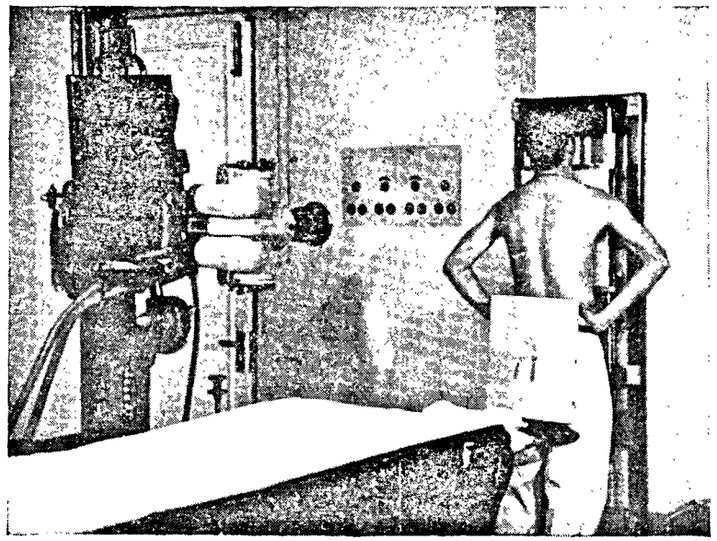


Fig. 1
The usual set up for a chest radiograph. A cone with too wide coverage is often used. The cassette marked ' A ' was experimentally placed in the position shown. There was considerable blackening of its contained film.

the usual exposure for a chest film, a considerable blackening of this film was produced, signifying the certainty of unnecessary and unwanted radiation including gonadal irradiation delivered to the patient, a fact drawn attention to by Stanford (1957). To cut down this radiation, one would have to use or improvise a cone to limit the beam to the area of the chest film at the usual distance of the tube. In any case, the patient should be protected below the area of interest by a portable metallic screen with at least 1 mm. lead equivalent. Till this screen is made available, the patient should wear the department's lead rubber apron in the position shown (Fig. 2) ; though this apron (of minimum equivalence 0·25 mm. of lead) provides only limited protection against the direct beam.

(b) *X-Ray of the Hand and Wrist.*—This group comprises a large proportion of patients in any X-ray department. The usual

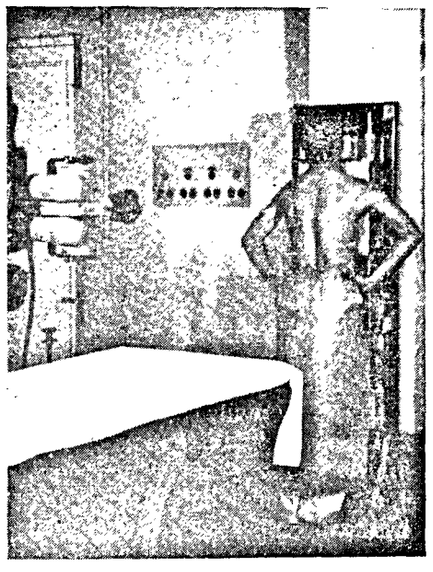


Fig. 2
In the absence of a portable metallic screen, the lead rubber apron offers some protection.

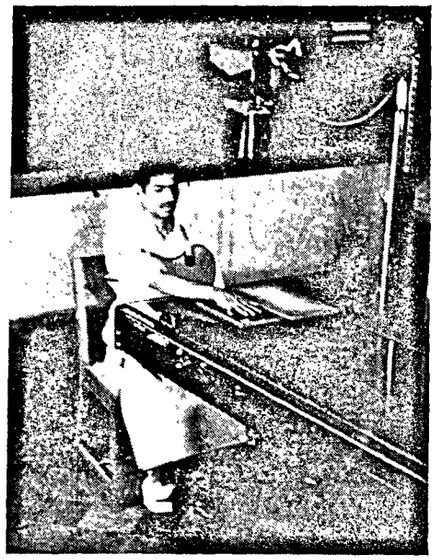


Fig. 3
Shows the usual position of the patient, the tube head with inadequate cone, and the cassette for X-ray of the hand. Patient is wearing the lead rubber apron.

position of the patient, the tube-head (with a very short cone) and the cassette is shown in (Fig. 3). It would be advantageous for the paient here to wear the lead rubber apron as there is a considerable risk of scattered radiation, as well as of the direct beam reaching the patient's trunk, gonads and lower extremities. The appropriate cone should, of course, if available, be used. With a shorter cone it would be advisable to reduce the focus film distance as far as practicable.

(c) *Dental X-Ray Examinations.*—In district hospitals this is usually carried out using the general X-ray apparatus or a portable X-ray apparatus. In X-rays of the upper jaw, the chest, abdomen and gonads may be irradiated by the direct beam, apart from scattered radiation and, in lower jaw X-rays, these areas receive scattered radiation. (Fig. 4) shows the protection to the patient that can be afforded by using the lead rubber apron. Some of these aprons are of lead equivalence up to 0·5 mm. and these should preferably be used. Also, the operator should use the narrowest cone and centre carefully.

(d) *Gonadal Protection.*—It should be the endeavour when X-raying the abdomen, the pelvis and the hip joints, especially of children, to protect the gonads, which lie in the direct beam. This is fairly easily achieved in the case of the male by the use of lead foil 2 mm. thick which can be applied over the gonadal area (Ardan and Kemp, 1957). In the female, protection of the ovaries when X-raying the pelvic contents is not feasible, but the ovaries should be protected in other examinations when the pelvic contents are not the centre of interest though the pelvis nevertheless falls within the direct beam *e.g.* the hip joints and upper femora. Lead foil of 2 mm. thickness should be used in the manner suggested by Abram, Wilkinson and Hodson (1958).

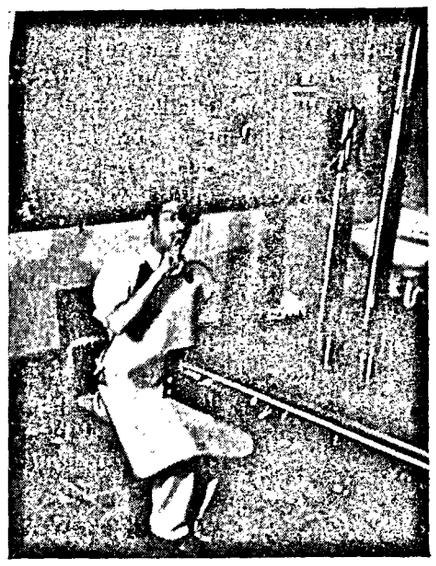


Fig. 4
The hazard to the patient from dental X-rays can be diminished by the use of the lead rubber apron.

(e) *X-ray of Children.*—Fig. 5 illustrates the position in which, it has been noticed, X.ray of small children is carried out. This is the position adopted for the skull, chest, spine, abdomen and even extremities. On account of lack of cones of sufficient number and variety, the child receives whatis in effect whole body radiation, and that, at the period when genetic and somatic susceptibility to radiation is greatest. Stanford (1957), referring to X-rays of the chest in children draws attention to this possibility. For protection, the aim should be to use as small a cone as possible at a distance which will cover only the area of interest. Adjacent areas should as far as possible, be shielded. Also, the gonads should be protected by direct application of lead foil of 2 mm. thickness (*vide* supra).

(f) *X-ray of Women.*—Particular care is required when X-raying pregnant women to avoid unnecessary radiation especially of the pelvis and, seriously to consider whether the film is absolutely necessary. Such precautions should really be extended to all women of reproductive age as, the fact of pregnancy need not be obvious, and, the foetus is rather more susceptible in the early stages of its development. Bohrens (1959) makes the observation that the most vulnerable period is from the second to the sixth or seventh week of intra uterine life; and this would therefore include a period of a week or more where pregnancy is possible though not manifest to the patient. Where conception is a possibility, therefore, he advises avoidance of pelvic X-rays during the last two weeks of the menstrual cycle.

Personnel Protection

It is perhaps worth reiterating that every measure undertaken for patient protection will be effective also in protection of personnel.

In district hospitals, the three rules of distance, time and shielding are often not well observed.

(a) *Distance.*—As we know, there is a rapid diminution of intensity of X-radiation with increasing distance according to the inverse square law. It is noticed, however, in many district hospitals that the control panel is placed very near the X-ray tube. This brings the operator unnecessarily close to the source of radiation. Though the X-ray rooms in many district hospitals are of inadequate size, the operator should endeavour to put at least six feet between himself and the tube.

(b) *Time.*—The time of exposure should be kept as low as feasible by the use of suitable intensifying screens and good films.

(c) *Shielding.*—Shielding for the radiographer is not provided in many district hospitals. This is necessary. The screen of at least 6 ft. height should be of 1·5 mm. lead equivalence and should be placed round the control panel. Till such a screen is provided there is no alternative but for the radiographer to wear the lead apron provided in the department, in spite of its weight and the discomfort in the hot weather. He should also, in such circumstances make the maximum use of the distance factor by making full use of the length of the cables.

Lead rubber gloves are usually covered with leather and lead rubber aprons with fabric. These coverings, while improving the appearances are a disadvantage, in that the condition of the lead rubber underneath cannot be visually assessed for cracks etc. The protective clothing in district hospitals has often been in use for several years. It is strongly advisable for the radiologist in district hospitals to test these articles of protective clothing regularly by taking radiographs of them—a precaution stressed by Osborn (1955).

Personnel and patient protection during certain procedures

(a) *Fluoroscopy.*—A note on fluoroscopy as regards both personnel and patient protection would perhaps not be amiss.

(i) *Dark Adaptation.*— It is observed that the radiologist sometimes does not spend the minimum of ten minutes as recommended by the I. C. R. P. (1954) in getting dark adapted before screening. The results are within one's own experience. The exposure has to be increased to produce a brighter image. Thereby the dose to the patient is increased, and, simultaneously, to himself and to the radiographer from scattered radiation.

(ii) *Centering of the beam.*—When the X-ray set is positioned for fluoroscopy it is worth while to check, especially in older sets, whether the tube is correctly centred to the fluoroscopic screen. This is often not the case and this would result in a portion of the direct beam striking the radiologist when the diaphragm is opened a little wider. This off-centering can usually be corrected by a slight adjustment of the tube head.

(iii) *Non-rigidity of the screen.*—In some older sets the screen cannot be fixed rigidly in position between the radiologist and the patient but is capable of swinging away if accidently touched by the patient and, sometimes, even of its own accord. The danger of the direct beam striking the radiologist is greater in these sets and it is best to ask the patient to hold the screen in position with his right hand.

(iv) *Limitation of the beam.*—In many sets the area of the beam extends beyond the screen when the diaphragm is fully opened. A device should be improvised to restrict the movement of the diaphragm control so that, as recommended by the I. C. R. P. (1954), there is always a rim of at least 5 mm. of un-illuminated screen all round. This will ensure that the direct beam is striking neither, radiologist nor assistants. Also of course, the beam must be narrowed down to include only the area of interest.

(v) *Palpation under the screen.*—It may perhaps surprise many radiologists if they screened their own lead rubber gloves and aprons and observed qualitatively how much radiation can pass through such articles of protective clothing. This may perhaps serve as a reminder that these articles, whose minimum lead equivalent is only 0·25 mm. are not meant to serve as a protection from the direct beam (Binks, 1955), but only from scattered radiation. Therefore, one should never palpate under the screen. If a compression cone is not fitted as in many district hospital X-ray sets, then one may use a non-opaque pad under the screen or use a fluoroscopic spoon.

(vi) *Setting of fractures and removing of foreign bodies under the screen.*—These need be mentioned only to condemn them and few surgeons would want to take such risks these days. A case however is within the author's knowledge of a surgeon who has suffered almost irreparable damage to his hands as a result of one long screening session for operative removal of a foreign body. Screening in such cases is usually started on the assumption that its purpose would be served in two or three minutes.

(vii) *Position of attendants.*—During fluoroscopy, it is noticed, there is a tendency for the radiographer to stand next to the patient to hand him Barium etc. In this position he receives much scattered radiation from the patient. The radiographer's position should be behind the protective screen. Till the screen is made available, he will have to stand behind the radiologist to take advantage of the protection afforded by the fluorescent screen (Binks, 1955) and he should wear a lead apron if one is available.

(viii) *Below knee radiation does to radiologist.*—Most lead aprons do not extend much below the knee especially in the sitting position. There is a likelihood of a fairly high level of radiation being reached at the feet and legs of the radiologist during fluoroscopy. As is well known, the method of avoiding this exposure in vertical fluoroscopy is to use a fluoroscopic chair having a protective barrier of at least 1 mm. lead equivalence. In some modern sets there is a protective barrier from table top to ground level for horizontal fluoroscopy. Also, a lead rubber drape of 0·5 mm. lead equivalent, hanging from the lower border of the screen in vertical fluoroscopy and from the near side of the screen is horizontal fluoroscopy, for cutting off scatter from patient to radiologist, as recommended by the I. C. R. P. (1954), is fitted to modern X-ray sets. This drape, however, is not fitted to many of the older sets in district hospitals, neither is the fluoroscopic chair provided. Also, there is usually no protective barrier below table top level in horizontal fluoroscopy. It may be possible, by improvisation, to attach a lead drape to the appropriate edges of the screen. In any case, till the fluoroscopic chair is provided, and a barrier as mentioned above fitted for horizontal fluoroscopy, the only solution would seem to be for the radiologist to extend his protective clothing up to the toes. This he could do by wearing a second lead rubber apron from waist downwards. Many departments are provided with more than one apron.

(ix) *Fluoroscopy due to shortage of films.*—It is common practice in many district hospitals and tuberculosis hospitals for the radiologist to have to screen patients' chests, owing to shortage of films. This is an undesirable practice. The diagnostic value of screening for the detection of small lung lesions or for assessing progress is limited. The radiation dose to the patient from screening is many times more than from a single film. The hazard to the radiologist and his assistants is substantially increased when such screening is made a practice. There would seem also to be a danger to the radiologist of infection from patients' breathing and perhaps coughing over him at a distance of hardly two feet. There would appear to be no alternative but that sufficient films be provided or an initial investment may be made in a photo fluorographic outfit.

(b) *Holding of patients and films.*—It often happens that patients, especially children, require assistance for immobilisation. On no account should X-ray workers do this duty as this will almost certainly result in over exposure. This duty should be performed by the patient's attendants. The attendants could with advantage use the lead rubber apron and gloves of the department. (I. C. R. P. Recommendations 1954) See (Fig. 5) in which no protective clothing is being used by the attendants). Especially inexcusable is the practice sometimes observed in district hospitals of X-ray workers holding the cassette for certain radiographs ; for instance, for the sitting PA of the chest for an ill patient. Instead, the cassette can be supported on pillows and the patient can himself hold it. Another objectionable practice (I. C. R. P. Recommendations, 1954) not infrequently seen is for the radiographer himself to hold the intra-oral film in position during dental radiography. With a little explanation, the patient succeeds in this task quite well.

(c) *Mobile X-ray units.*—When these are used in the wards, it is not practicable for the protective screen to be used. Also, with

Fig. 5
X-ray of the child often results in whole body radiation! The attendants too need protection.

many such units it is not possible to make use of the protective screen even when they are used in the X-ray department. The radiographer should therefore make it a habit to use the full length of the hand timer cable to increase his distance from the tube. He should wear the lead rubber apron when operating these sets and use fast screens and films to cut down the time of exposure.

Leakage from the x-ray tube housing

In some older sets, such as those that are available in some district and other hospitals, there may be a higher than permissible leakage of radiation at certain points in the tube housing. This leakage will increase the radiation hazard to patients and personnel. A rough check can be made by blocking the direct beam with a 4 mm. thick lead plate, wrapping suitably covered marked films around the tube housing and making an exposure at maximum kV and mA. The films can be developed and observed for areas of increased blackening. For more accurate determination dosemeters would have to be used. (*Vide infra*). Suitable corrective action would have to be taken if such leaks exist.

Crowding in the x-ray room

It is noticed in some district hospitals that the X-ray room is crowded with patients awaiting their turn or with an unnecessary number of relatives of the patient. Our aim being to reduce population dose, no person should be permitted in the X-ray room whose presence is not necessary.

Special examinations

The protection requirements in special radiological examinations, for instance angiocardiography, have not been considered here. These require more elaborate protective devices. Such examinations are not usually conducted in district hospitals at present. The author, however, has seen, more than once, femoral angiography being carried out with the syringe being directly attached to the needle, the operator's hands therefore being in the direct beam.

Blood counts on staff

Though these are of limited value (Loutit, 1955) the practice of performing routine blood counts on X-ray workers should be continued.

Personnel monitoring

It is well known that the Health Physics division of the Atomic Energy Establishment, Trombay, Bombay runs a film badge service. It is perhaps unnecessary to state that the X-ray department of every district hospital should join this service. The cost is approximately Re. 1/- per film pack per week in addition to the initial payment of Rs. 10/- per person. The Health Physics Division sends a report of the weekly does received by every person covered by the service and a record should be maintained of this dose. With proper observation of the safety rules, it should be possible to keep well below the maximum permissible does even in a busy radio-diagnostic department.

Protection Surveys

The Health Physics division of the Atomic Energy Establishment also carry out Radiation Protection Surveys of Diagnostic and Therapeutic X-ray Departments. During the course of these surveys, the physicist performs a number of quantitative tests. These include the determination of radiation levels at occupied areas in the X-ray room, the measurement of leakage radiation from the tube housing, the efficacy of protective clothing and protective equipment, the half value layer of the radiation and the desirability of incorporating additional filtration for the beam. A protective survey would make one aware of defective equipment or faulty protective measures to which, possibly from long usage, one had grown accustomed.

Refresher courses at the A. E. E. Trombay

It is worth mentioning here that the Health Physics Division of the Atomic Energy Establishment conducts periodical refresher courses on the safety aspects of the medical uses of radiation for hospital physicists, radiologists and other medical practitioners. It was the author's good fortune to attend the first of these courses, during which the importance of the problem was brought home to him. This led to his visiting several hospitals with a view to ascertaining the radiographic methods used, the protective equipment; available, and the difficulties encountered in the early procurement of adequate equipment; and also led him to consider how best the limited available protective equipment could be used.

Summary

1. Mention is made of the somatic and genetic effects of radiation.

2. Certain difficulties in maintaining adequate personnel and patient protective measures in smaller hospitals owing to the lack of adequate protective equipment are mentioned and interim measures suggested for the common X-ray examinations, full use being made of the department's protective clothing and suitable pieces of lead foil of 2 mm. thickness.

3. Observations on certain faulty practices have been made and their danger stressed.

4. The facilities available from the Health Physics Division of the Atomic Energy Establishment are stated.

Acknowledgement

The author is grateful to Sri U. V. Gopala Rao, Scientific Officer, Health Physics Division, Atomic Energy Establishment, Trombay, for his valuable advice and helpful criticism.

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EDITORIAL COMMENT

"The editor is thankful to Lt.-Col. P. F. Mathias, for his article, which is published, as it is thought, it will be of great value to the radiologists and technicians, working specially in District Hospitals, where working conditions are not very satisfactory and protection of staff and patients from radiations is inadequate."

ERRATA

INDIAN JOURNAL OF RADIOLOGY

Vol. XV, No. 3—August 1961

DELETE—" & A. R. Deshpande " appearing on the front cover page in line 4 below " CONTENTS " after " M. G. DESAI ".

DELETE—" And Dr. D. R. DESHPANDE, Senior Radiologist, J. S. Group of Hospitals, Bombay " appearing below " (In conjunction with Dr. T. H. Tulpule, Dr. B. J. Vakil, Dr. S. J. Shah, Dr. P. M. Udani) " after " M. G. DESAI, Hon. Asst. Radiologist, J. J. Group of Hospitals, Bombay " in the authorship of the article appearing on page 97.

A D D—" And Dr. A. R. Deshpande, Senior Radiologist, J. J. Group of Hospitals, Bombay " in continuation of the existing foot note on page 97.

Abstracts of Radiological Literature

Goffredo G. Gensini and Arthur Ecker, Percutaneous aortocerebral angiography, A diagnostic and physiological method, Radiology, December 1960, Vol. 75, 885-893.

A new standardised method of radiographic visualisation of the aortic arch, its branches, all cerebral arteries and veins and the jugular veins, is reported. It is performed, usually under local anaesthesia, by percutaneous puncture of the femoral artery for insertion of a guided catheter. The catheter is advanced under fluoroscopic control, to the arch of the aorta. Then 5 ml. of 75 per cent Hypaque-M is injected manually for positioning and sensitivity test. When the patient is positioned correctly, 30 c.c. of 75 per cent Hypaque-M is injected at body temperature in one second. A series of 30 films is made starting simultaneously with the beginning of the injection, the first 8 at the rate of 4 per second, and the remainder at 1½ per second.

After at least 15 minutes, another injection of 20 c.c. of contrast medium is made for lateral views of the skull, and the number of films is reduced proportionately to the rate of flow. A third injection of 25 c.c. is made after further 15 minutes for an extended submentovertical view. The procedure lasts approximately 2 hours, when the catheter is withdrawn, the femoral artery is compressed manually for 15 minutes and a pressure bandage applied.

This method is useful in cases where aneurysm, stenosis, malformation or displacement of the affected vessels is suspected. It is also of value for studying the rate of blood flow within individual areas in any part of the brain.

A series of 54 injections in 18 patients has been performed without mortality, or significant morbidity. The practical value in cases of increased intracranial pressure, as in brain tumor remains to be determined. But it should not be lightly undertaken by those unfamiliar with this procedure. The authors emphasise two dangerous aspects :— (1) is the possibility of threading the spring guide through perivascular tissues. (2) is the necessity of continual visual control by Fluoroscopy. The disadvantages of technique are (1) it cannot be done when there is excessive arteriosclerotic tortuosity or plaque formation of the iliac artery. (2) It is unsuitable in presence of an increased intracranial pressure as in brain tumours. The authors are now using Renografin 76 for the procedure because of its low viscosity, and production of less discomfort to the patient.

S. N. Deboo, Bombay.

H. F. W. Pribam and G. F. Swann, The radiological changes and clinical incidence of endocrine effects in sellar and parasellar tumours, Radiology, December 1960, Vol. 75, 877-884.

50 craniopharyngiomas, 50 chromophobe adenomas, and 15 cases of increased intracranial pressure with the third ventricle acting as a tumour were studied.

The craniopharyngiomas showed deformity of the posterior clinoid process and undercutting of the anterior clinoid process. The latter occurred only in the presence of an enlarged pituitary fossa. Calcification was seen in 28 cases, it was frequently flocculent, but in one case it consisted of a curvilinear streak similar to that found in

aneurysms. Endocrine changes were found in 30 cases. Changes in the hair and skin were the most common followed by obesity and hypogonadism. The amount of sellar destruction showed no bearing on the incidence of endocrine changes.

In the chromophobe adenomas, the pituitary fossa is always enlarged, the dorsum sella is thinned and destroyed inferiorly. The posterior clinoids are pushed back, and the anterior clinoids are in many cases elevated and undercut. Calcification almost never occurs. Ventriculogram shows blunting or obliteration of the optic and infundibular recesses. Endocrine disturbances were changes in growth and distribution of hair, then skin changes, followed by obesity and hypogonadism. Polyuria and polydipsia were uncommon. It is disappointing to find that nocorrelation exists between the amount of sellar destruction and the occurrence of endocrine disturbances. No difference in the average height of the anterior end of the 3rd ventricle above the sella was recorded between those patients showing endocrine changes and those who did not.

The suprasellar meningiomas (15 cases) showed characteristic changes with hollowed out anterior clinoids, flattened posterior clinoids. All showed visual failure, none had endocrine disturbances.

Aqueduct stenosis showed an enlarged 3rd ventricle behaving like a tumour, eroding the pituitary fossa, flattening or enlarging it. Anterior and posterior clinoids are destroyed from above. Only 2 out of 15 cases showed endocrine changes. Here again no relation between radiological and endocrine changes was found.

The conclusion is that the clinical incidence of endocrine disturbances was found to bear no correlation to the size of the tumours and amount of destruction of pituitary fossa.

S. N. Deboo, Bombay.

Alfred I. Schmitz and Samuel B. Haveson, The Roentgen diagnosis of eighth nerve tumours, Radiology, October 1960, Vol. 75, 531-543.

Approximately 6 per cent of all intracranial neoplasms are acoustic neurinomas. Though histologically benign, they often have a malignant course due to their large size in a critical area, by the time, the diagnosis is established. By a detailed study of petrous bone, at the present time, it is possible to show tumour changes in approximately 85 per cent of cases.

The internal auditory meatus should be studied with atleast 3 projections (a) the Lysholm modification of the Stenver's view (b) the Chamberlain-Towne anteroposterior projection (c) the basal projection. Films should be repeated until the internal auditory meatus can be studied by multiple projections free of bony parts.

The shape rather than size of the internal auditory canal is the critical factor in evaluation of changes due to tumour. The first change due to an acoustic neurinoma is an erosion of the bony wall. These tumours tend to grow out of the canal superiorly and posteriorly. The depth of the canal and the lower borders are involved much later, but eventually the whole of the meatus and the surrounding petrous bone can be destroyed. The basal view shows destruction of the posterior medial wall of the porus as its earliest finding. On occasion a tumour may grow in the depth of the meatus without widening the porus, but only causing the deep portion of the canal to be large and round. Unilateral erosion of the internal auditory meatus is not pathognomonic of acoustic neurinoma.

Pneumocephalographic findings are reliable enough to enable one to diagnose small extracerebral tumours in the cerebello-pontine angle. The ventricular system of the posterior fossa usually fills during pneumoencephalography in the presence of an acoustic neurinoma. The tumour displaces the aqueduct and 4th ventricle posteriorly and upward and also to the healthy side. The 4th ventricle is more strongly displaced than the aqueduct and is also rotated. These tumours may become large enough to cause a posterior displacement and elevation of the posterior part of the 3rd ventricle. These tumours are usually advanced when clinically recognised. Radiological technics are now available to detect tumours at an early stage, if clinical suspicion was aroused when involvement is limited to the 8th nerve.

S. N. Deboo, Bombay.

James G. Bulgrin, Edmund L. Dubois and George Jacobson, Peptic ulcer associated with corticosteroid therapy, Serial roentgen studies, Radiology, November 1960, Vol. 75, 712-721.

In 41 of 77 patients, almost all with diagnosis of systemic lupus erythematosus examined roentgenologically prior to steroid therapy, there were only 2 abnormal studies, both demonstrating a duodenal bulb deformity. Once steroid administration had started, serial roentgen examinations were done at intervals of 3 months. The programme was carried on for 2½ years.

Of the 63 steroid-treated patients, 48 showed no peptic ulcer, where as peptic ulcer was shown roentgenographically in 15 patients. Of the radiologically demonstrable ulcers, 10 were gastric and 5 duodenal. Eight of the gastric ulcers were in the distal stomach and only 2 in its mid-portion. One gastric ulcer was located on the greater curvature. This appeared after 18 months of therapy. A Gastrointestinal study six months previously did not show it. In several instances, gastric ulcers were shallow and surrounded by mucosal oedema. In many instances however, the gastric ulcers associated with steroid therapy did not differ from those in patients not receiving steroids. In a few instances, mucosal changes, presumably due to oedema, preceded the appearance of a gastric niche. Of 12 males, 5 were found to have an ulcer as compared to 12 females.

In all but 6 instances, steroid therapy was administered for more than 6 months before peptic ulcer was diagnosed. The minimum time for the roentgenographic appearance of an ulcer was two months. The ulcer incidence of 23 per cent with dosages of 40 to 59 mg./day, and of 47 per cent with dosages of 60 mg./day furnishes a striking correlation of ulcer incidence with dosage. The minimum dose of individual drugs (mg./day) associated with occurrence of peptic ulcer is: prednisone and prednisolone 12·5 triamcinolone 32·0 and methyl-prednisolone 36·0, dexamethasone 3·5.

The ulcers in 10 patients healed with reduced steroid dosage and/or administration of an ulcer regime. Healing time was variable, in the majority between 5 and 12 months.

2 patients with peptic ulcer were asymptomatic, 2 others were psychotic. In the rest 76 per cent subjective symptoms varied from pain relieved by food, heartburn and vague upper abdominal distress. Of the total of 63 patients treated with steroids, 28 had gastrointestinal symptoms.

S. N. Deboo, Bombay.

J. G. Duncan and Eric Samuel, Extra—abdominal abscesses of intestinal origin, Br. Jour. Radiology, October 1960, Vol. 33, 627-630.

The use of antibiotics in abdominal infections has so modified the clinical picture of abdominal inflammatory processes that large intra-abdominal abscesses may develop with little or no constitutional disturbances. Inguinal abscesses, are usually considered to be due to local disease for *e.g.* joint disease in the hip, or bone disease in the femur, pelvis or lumbar spine, with the result that the alimentary origin of the abscess is overlooked.

Perforation of the bowel may give rise to peritonitis, or localised abscess formation. When it becomes adherent to internal structures in the neighbourhood, internal fistulous communications with bowel, bladder or vagina may occur. Less frequently, it results in an extraperitoneal abscess tracking to the inguinal or femoral regions.

Three cases of extra-abdominal abscesses of intestinal origin are described, presenting with cellulitis in the groin. Two of these presented on the left side and were due to carcinoma of the colon and the third case presented on the right side and the underlying cause was Chrohn's disease of the terminal ileum.

The radiological findings are similar to those occurring in the other sites, but certain features may suggest an intestinal origin. (a) Soft tissue swelling. The continuity of this swelling (with blurring of intermuscular planes and forming a homogenous mass) with the site of origin of the abscess may be demonstrated. (b) Gas formation. The presence of gas in the abscess is suspicious of an intestinal origin. The gas may appear as numerous small bubbles in the subcutaneous and intermuscular planes, or may be aggregated into large bubbles. A direct continuity may be demonstrated under the inguinal ligament between gas in the thigh and in the pelvis. The gas in gas gangrene may be suspected, but presence of gas in subcutaneous tissues and its absence in the muscles excludes the condition. C. Faecal material. On occasions faecal material may be seen within the abscess, when the alimentary origin will be quite obvious.

S. N. Deboo, Bombay.

George-Frederik Saltzman, Solu-Biloptin (SH 550), as a contrast medium for peroral cholegraphy, Acta Radiologica, December 1960, Vol. 54, 417-425.

A new contrast medium for investigation of the bile ducts, Solu-Biloptin, has been tried out, and comparisons are made with other media. Its iodine content is 61·7 per cent. It is supplied in bottles containing 3 gram of the contrast medium in powder form which should be mixed with water before use.

In all examinations, views were first taken 30 minutes after the first administration of contrast medium, and then at 15-minute intervals. As soon as the medium was visible in the bile-ducts, the patients were given 1 mg. of morphine per 10 kg. bodyweight. After optimal contrast density had been reached in the ducts, a tomographic examination was carried out and the sphincter spasm was arrested with nitroglycerine or secergan.

Upto now, 62 cholegraphies were undertaken in 61 patients, using 6 g. solu-biloptin. Not even with this large dose of contrast medium were the reactions troublesome. 14 experienced nausea, only in one case vomiting occurred. No allergic reactions were observed.

Diagnostically adequate contrast filling in the bile-ducts was obtained in 51 of the 62 patients. In 6 cases, the ducts were not demonstrated distinctly enough for diagnosis, and in the remaining 5 cases they were not visible. Closer analysis of the 5 cases in which bile ducts failed to fill revealed that 2 of the patients had cirrhosis of the liver. In 2 other cases, the intestine contained a large amount of unabsorbed contrast medium during the entire examination. Intravenous cholegrafin with biligrafin-forte was carried out later in 5 of the 11 cases in which peroral cholegraphy with solu-biloptin had not given satisfactory contrast density. There was no filling of the ducts in one case, and in the other 4 cases, biligrafin-forte produced diagnostically adequate filling of the ducts. 2 of these patients had jaundice. Optimal contrast density was reached within 2½ hours. Biligrafin still holds its position as our most important contrast medium for cholegraphy. It is considered however that peroral cholegraphy is preferable in the aged, in patients with cardiovascular diseases, and in those who show a positive reaction to a Biligrafin test.

S. N. Deboo, Bombay.

J. Scott Dunbar, Douglas W. MacEwan and Francois Hebert, The Value of dehydration in intravenous pyelography—An experimental study, American Jour. Roentgenol, November 1960, Vol. 84, 813-836.

21 normal male adults were subjected to two intravenous pyelographies, one with essentially no preparation, and the other with no preparation except a period of 15 hours of dehydration (fasting). A similar study was done in animals.

Evaluation of the results twice by 2 different observers without knowledge of identity or state of preparation of the patient was done to correlate the roentgenographic findings with chemical analysis of urine and in vitro urine density estimations and measurements.

The results in the form of 4 graphs indicate that dehydration tends to give a slightly better diagnostic pyelogram after 10 minutes. At 5 minutes, there is little difference between the 2 methods of preparation. The spread between the 2 methods in favour of dehydration increases at 30 to 60 minutes. The results show that most useful pyelograms are obtained in hydrated patients in the early post-injection period, and in dehydrated patients in the later period. There is a slight and consistent improvement in the quality of the pyelogram following dehydration.

These findings suggest that the adult patient should be subjected to a period of dehydration prior to intravenous pyelography, if this does not cause inconvenience or discomfort or danger. If however it is necessary to carry out pyelography without preparation by dehydration, pyelograms of comparable quality can be obtained by taking a larger number early in the examination.

Experiments of the same nature were carried out in rabbits with similar results.

S. N. Deboo, Bombay.

Homer L. Twiggs Jr, Periureteral fibrosis, American Jour. Roentgenol, November 1960, Vol. 84, 876-885.

Cases of periureteral fibrosis reported in the literature have been reviewed and statistically analysed. Four personal cases are reported and representative roentgenograms are included.

The chief complaint is back pain radiating into the lower extremities, one patient presented early anuria, but this is a frequent occurrence in the course of the illness. The paucity of urinary symptoms is remarkable. Vomiting and abdominal pain occur. It is not uncommon however for the patient's symptoms to be attributed to a duodenal ulcer or arthritis, as one patient had a hysterectomy and another a laminectomy during the course of the illness before the diagnosis of periureteral fibrosis was made. The laboratory investigations show either red blood cells or white blood cells in urine, with the blood nitrogen elevated.

The etiology is unknown. Some suspect it to be idiopathic, others consider it a vasculitis or collagen disease. The frequent association is pyelonephritis with periureteral fibrosis striking, pointing it to an infectious etiology. Others think it to be an inflammation of Gerota's fascia. It is possible that infection or tumour from many different sources may initiate an excessive reaction in this area producing a fibroblastic proliferation.

The roentgenographic findings show that some have a normal intravenous pyelogram 2 weeks to 6 months prior to the diagnosis. Others show bilateral pathology consisting of either obstruction, hydronephrosis or failure of the contrast medium to be excreted. Some show unilateral changes. So that there are 2 consistent findings. One is a hydronephrosis with a hydroureter in the upper third, tapering gradually to a smooth narrowing in the mid-ureter, the distal part of the ureter remains normal. Another clue to the diagnosis is the sudden loss of function of the kidney known previously to show a normal pyelogram. An obliteration of the normal fat lines outlining retroperitoneal structures, particularly the psoas borders, should be looked for.

In therapy, ureterolysis is the most frequent operation performed with removal of part or all of the fibrous tissue. In acute cases, a nephrostomy may be performed before surgery is attempted. Roentgen therapy was given in 5 cases, the dose varying between 300 and 800 r delivered through 2 portals in 6 weeks, and had symptomatic improvement after the 3rd week of therapy. It is however felt that the long term biologic effects of ionising radiations limit their role in the treatment of this disease.

S. N. Deboo, Bombay.

C. J. Hodson, and David Edwards, Chronic pyelonephritis and Vesico - ureteric reflux, Jour. Fac. Radiologists, October 1960, Vol. XI, 219-230.

Ten cases are reported reviewing the clinical and radiological findings, and tabulating them in another ten cases. The attention is drawn to the frequent association between chronic pyelonephritis and vesico-ureteric reflux.

The clinical findings were largely non-specific, being common to many urinary conditions, with one exception. That was the occurence in a small number of cases of pain in the loin during micturition. This symptom is a direct indication that reflux is occurring and this has been corroborated by cystography.

The radiological technique by which vesico-ureteric reflux is shown is the use of micturating cystogram. As a result of over 600 micturating cystograms, the authors do not believe that reflux occurs in the normal urinary tract. It is however a regular complication of certain diseases of the urinary tract, including congenital bladder-neck obstructions, urethral valves, prostatic enlargement, urethral stricture, and neurological disorders causing disturbance of bladder function. Diseases of the bladder wall and ureteric orifices may give rise to reflux, these are acute and chronic infections, particularly tuberculosis, inflammatory changes resulting from chemical irritation, neoplastic involvement, and trauma from surgical procedures. Reflux also occurs in primary megaureter and megaureter megacystitis.

There are 6 radiological signs indicating reflux. They are :

(1) Localised diminution in thickness of the renal substance usually associated with shrinkage of the adjacent pyramid (Calycine clubbing or caliectasis).

(2) Very small kidneys with generalised caliectasis, marked narrowing of their substance, producing a small amount of urine. But the ureter is large, distinguishing it from hypoplastic kidneys.

(3) Unexplained non-obstructive dilatation of the upper urinary tract.

(4) Undue distensibility of the urinary tract.

(5) A bladder-residue in a child. Normally complete emptying of the bladder occurs during micturition. A residue in a child is often an indication of bladder-neck obstruction in which case, the bladder wall usually shows trabeculation. It may however result from reflux, when it would be a false residue, representing urine which has passed back into the ureters during micturition, held there and returned to bladder, when relaxation of wall occurred.

(6) Unexplained renal osteo-dystrophy, showing a mixture of rickets, hyperparathyroidism and bone sclerosis.

S. N. Deboo, Bombay.

M. E. Berk, Combined Carotid-vertebral angiography—A method of vertebral angiography, British Journal of Radiology, December 1960, Vol. 53, 780-783.

Cerebral angiography has shown that there is no mixing of the streams of the carotid and basilar systems, although communication exists between the respective systems. Occasionally however, due to altered haemodynamics, either congenital or acquired, both systems are visualised simultaneously. In view of these facts, a method has been developed to simultaneously opacify both systems.

A catheter has been passed to the right common carotid artery, the optimum intra arterial length of catheter was found to be 1 to 1·5 inches. Urograffin (20 c.c. of 60 per cent) was injected. About half of this entered the right subclavian artery, the rest entered the right carotid artery. Exposures made when a quarter of the medium had been injected showed the extracranial portion of the arterial system. Those made at the end of the injection showed the intracranial portion. It is found that the sub-mento-vertical projection is the best.

Haematoma formation, sometimes alarming, has proved troublesome, esp. in old arterio-sclerotic patients after removal of the catheter. During removal of the catheter, and for the next 5 minutes the artery must be compressed to avoid haematoma.

The above technique is safer than direct vertebral angiography, and was used in 2 children.

The indications for combined carotid-vertebral angiography are :—unexplained sub-arachnoid haemorrhage, carotid-basilar deficiency syndromes, tumours deriving blood-supply from both systems, unsuspected anomalies such as aberrant right subclavian artery.

The disadvantage is that only the right side may be visualised in this way. However the author is investigating the possibility of visualization of the left side using an acutely-angled Per Odman catheter with multiple perforations.

Ten cases have been successfully catheterised. Films of adequate quality were obtained in all cases. The vertebral artery was opacified slightly later than the carotid artery, but in practice this was of little importance.

S. N. Deboo, Bombay.

H. Horwitz, Intra-arterial therapy: A review of its clinical applications in malignant disease, Br. Jour. Radiology, November 1960, Vol. 33, 659-679.

An agent introduced into an artery proximal to a neoplasm will be carried directly to the neoplasm and its neighbouring tissues. But much of it will be carried within the capillaries through the perfused tissues and will emerge on the venous side, to enter the circulation. Through the lungs all organs of the body will receive the substance in dilute form. Since the systemic effects of the cancericidal agents are harmful to the organism as a whole, much of the advantage of the intraarterial route may be lost. If the toxic agent is retained, absorbed in the first capillary bed, then the scope and value of the cancericidal substance may be extended in this way.

Large numbers of tumours can be attacked *via* their arterial blood supply, by transcutaneous catheter techniques, such as that by Seldinger. Attempts have been made to influence the rate at which therapeutic substances, administered intra-arterially will enter tumour tissue by the preliminary administration of histamine. Attempts to increase tumour metabolism and the rate of mitoses prior to treatment by administration of tri-iodothyronine, and to increase the rate of chemical reaction by perfusing at high temperatures(These procedures are of doubtful value) have been described.

The cases for intra-arterial therapy must be well selected. Preliminary investigation must include clinical and radiological assessment, and here arteriograms using a contrast medium are of the greatest value. Where arteriographic techniques are not applicable, studies using Fluorescin or 32 P. may help. Should the lesion be poorly vascularised, it is probably not worth attempting intra-arterial therapy.

Of the various therapeutic agents, Nitrogen Mustard, Fluourescin, Alizarin Red S. Thymidine, Radioactive Phosphorus (^{32} P) etc. may be mentioned. If radioactive, an agent for intra-arterial administration should preferably be a β emitter. A short biological half-life and hence a short effective half-life would be advantageous.

After the catheter has been correctly positioned, the medication can be introduced as a single shot or as an intermittent injection or fractionated therapy. By using two or more agents in combination by intra-arterial infusion quantities of each, significant systemic toxicity can be avoided. A possible combination of this type is nitrogen Mustard and hemi-sulphur Mustard. It is claimed to be of particular value in the treatment of Ovarian Carcinoma.

A therapeutic agent can be introduced into the ascending aorta or the aortic arch *via* a catheter introduced at the groin, and thus reach all tissues of the body, the intra-thoracic structures, bronchi and the pleura. Intraaortic medication introduced at a level below the left subclavian artery will reach the thorax and abdomen, and if given just above the origin of the coeliac axis, the whole abdomen and pelvis can be treated.

Pelvic tumours such as carcinomas of the bladder, cervix or rectum are amenable to intra-arterial approach.

With primary tumours of the tongue, floor of the mouth, antrum, pharynx etc. lymph node metastases are very common. Surgery and radiation therapy sometimes fail to control the malignant process. Here intra-arterial therapy using the external carotid artery or its branches can be given continuously or in fractions over several days, using either drugs, or radio-sensitisers, or a suspension of large radioactive particles. Primary brain tumours, in particular gliomas invite intra-arterial therapy.

Renal tumours, in particular, hypernephromas can be in a similar way treated. An agent given into the renal artery could be expected to reach the whole neoplasm, so that intra-arterial therapy might be a reasonble alternative to preoperative radiotherapy in renal carcinomas.

Treatment of carcinoma of the stomach similarly *via* the coeliac axis is theoretically possible, but such treatment will be severely limited by the tolerance of liver and spleen. The treatment would entail an indwelling catheter in the coeliac axis for a period of about 5 days.

The complications of intra-arterial therapy are infection, embolism and accidents.

The contraindications to this type of therapy are:

(1) Ischaemia of the limb or part supplied by the artery to be catheterised due to causes such as arteriosclerosis etc.

(2) Valvular or congenital heart disease.

(3) A bleeding or haemorrhagic tendency.

S. N. Deboo, Bombay.

V. Beck and K. Zahn, Cataract as a late sequel of contact roentgen therapy of angiomas, Acta Radiologica, December 1960, Vol. 54, 443-448.

Control examination of a group of 51 children, aged between 5 and 17 years of age, who had contact roentgen treatment with Van DerPlaat's apparatus for angiomas of the eye lids or in close vicinity of the eyes was performed with special reference to the presence of late post-radiation ophthalmic changes. The time interval between the termination of treatment and the ophthalmic examination was 4 to 14 years.

The irradiation of radiosensitive angiomas in children, esp. in angiomas localised in surgically difficult sites, affects not only the angiomas but also healthy tissues, some of which, especially the lens, are particularly radiosensitive, the young developing lens is more susceptible than the adult lens.

The latent period of the cataract and its degree depend on the age of the lens and the dose of radiation. It is emphasised that a cataract may develop after doses which would cause no clinical disturbances in any other parts of the body. 600 r appears to be the threshold dose for roentgen radiation with 200 kV.

Ophthalmologic findings were normal in 46 of the children. Radiation cataract was evident in 2 cases. Histories of 2 cases are given. Treatment was performed in both cases with Van der Plaats apparatus for contact therapy at 50 kV, 2 mA, FSD 2 cms, Filtration 1 mm. Al. In one case, the lens showed fine linear opacities in the subcapsular zone of the posterior cortex converging radially from the equator towards the lower pole. A denser ring shaped opacity was also present in this region.

The cause of radiation cataracts is presumably due to the cumulative effect of irradiation brought about by ineffective protection. The eye on the affected side should be properly shielded, and preferably both eyes should be shielded.

S. N. Deboo, Bombay.

A. Goldberg and D. A. Seaton, The diagnosis and management of myelofibrosis, myelosclerosis and Chronic myeloid leukemia, Jour. Fac. Radiologists, October 1960, Vol. XI, 266-270.

Four cases of myelofibrosis and myelosclerosis and four with chronic myeloid leukaemia are compared in respect of clinical features, haematological and radioisotopic (radioiron and radiochromium investigations).

The 2 diseases have a similar clinical presentation. There are the general symptoms of anaemia, such as dyspnoea, angina of effort or claudication, or congestive cardiac failure. The spleen is greatly enlarged, and may even occupy most of the abdomen. Other patients present bone pain and even develop gout. A few others show spontaneous bleeding or fever. The 2 diseases may be differentiated by blood and marrow investigations.

The blood picture of myeloid leukaemia shows a white cell count elevated to 100,000/c. mm. and abundance of platelets except in the terminal stages. In myelofibrosis and myelosclerosis, the white count is rarely above 50000/c. mm. marked anisopoikilocytosis. The blood films shows a leucoerythroblastic picture with immature white cells and nucleated red cells, and abundant platelets. The marrow picture in chronic myeloid leukaemia, shows characteristic hyperplasia but in myelofibrosis, there is an increase of megacaryocytes, fibrosis and reticulum fibres. The radioisotopic investigations are of no value.

The treatment of chronic myeloid leukaemia is aimed at relieving symptoms. Iron administration in iron deficiency may improve haemoglobin level. Blood transfusions are needed to relieve anaemia. If the anaemia is due to excessive hemolysis, splenectomy should be considered. For control of the leukaemic process, irradiation of the spleen is the treatment of choice. Busulphan is effective under careful haematological control. Radiophosphorus (^{32}P) is also used. In myelofibrosis, treatment is required for anaemia. In congestive cardiac failure, slow transfusion and administration of diuretics will improve the patient. Splenectomy is now used, and the radioisotopic studies help to define the place. Splenic irradiation in myelofibrosis or myelosclerosis is considered to be unwise at any time by some, others have reported good results. The results of the radioisotopic investigations proved helpful when splenic irradiation and splenectomy were considered in the treatment of patients with myelofibrosis.

S. N. Deboo, Bombay.

Reprinted from The American Journal of of Roentgenology, Radium Therapy and Nuclear Medicine, Vol. LXXXIII, No. 4, April 1960. The International Congress of Radiology and the International Society of Radiology.

Organization.—The International Congress of Radiology is organized according to provisions set forth in the "Rules and Regulations" which function as a Constitution and By-Laws. The document establishes three important Committees by which the Congresses are governed, namely: (1) the National Board of Management, (2) the International Committee, and (3) the International Executive Committee.

The National Board of Management of the host country has complete responsibility for the organization, management and financing of any Congress. It is composed of the President, chosen by the delegation of the host country at the time its invitation is accepted; of the Secretary General and other officials appointed by the President and has a headquarters office in the City in which the Congress is to be held.

The International Committee is vested with the ultimate authority of the International Congress. It is composed of the Delegations appointed by the National Radiological Society or Societies of all countries with desire to participate in the Congress. Each delegation consists of not more than five individuals, of whom one is selected as Chairman. Each delegation has one vote, voiced by its Chairman. The meetings of the International Committee are held prior to the opening of the Congress, subject to the call of the President.

Because of the large size of the International Committee, an International Executive Committee of eleven individuals was established. The Executive Committee is composed of the President, of the last three living past Presidents and of the Chairmen of the National Delegations of seven countries selected by mail vote by all National Delegations registered at the Headquarters office of the Congress. Prior to the International Committee meeting, the Executive Committee discusses international problems affecting the Congress and prepares recommendations for the larger body. It acts much as a steering committee.

History of the Congresses.—The First International Congress of Radiology was organized in London in July, 1925. It was intended to provide an opportunity for radiologists of various countries to become personally acquainted with each other and to discuss scientific problems common to Radiology in all nations. The President was Mr. C. Thurstan Holland, an eminent British Radiologist.

At the London meeting, nine resolutions were adopted by the International Committee which established the basic organization of the Congress and which were later formally arranged as the "Rules and Regulations" of the Congress.

The Second International Congress was held in Stockholm during the summer of 1928, with Professor Gosta Forssell as President.

The Third International Congress was held in Paris in the summer of 1931. Dr. Antoine Beclere was President.

The Fourth Congress took place in Switzerland in the summer of 1934, with Professor Hans Schinz, as President. The meeting opened in Zurich and later moved to St. Moritz, high in the mountains.

The Fifth Congress was held in Chicago in August, 1937, Dr. Arthur C. Christie was President.

The invitation from Germany to hold the Sixth Congress in Berlin in 1940, under the Presidency of Professor Hermann Holthusen, was accepted. The Second World War interfered and many records were lost.

After the war was over, the British Radiologists wisely decided to revive the International Congress. With wholehearted international cooperation the Sixth Congress was held in London in 1950 with Professor Ralston Paterson as President.

The Seventh Congress was held in Copenhagen in 1953 under the Presidency of Professor Flemming Moller.

The Eighth Congress held in Mexico, D. F. in 1956, with Professor Manuel Madrazo as President.

The Ninth Congress occurred in Munich in 1959 with Professor Boris Rajewsky, Ph.D., as President.

The International Commissions.—One of the problems confronting radiology in the early twenties was the establishment of a unit of measurement of x-rays. Prior to the First Congress this problem was studied independently in several countries. At this time a Committee for the standardization of x-ray measurements in the United States was organized with Dr. Edwin C. Ernst as Chairman. A year or more before the First Congress, this Committee met in Washington. Without difficulty the co-operation of Mr. Herbert Hoover, then Secretary of Commerce and of the Director of the National Bureau of Standards, which was under Mr. Hoover's jurisdiction, was secured. The interest of the Director of the Budget was more difficult to arouse. However, with the help of Mr. Hoover an appropriation of thirty thousand dollars was obtained from Congress for the purpose of establishing a section in the Bureau of Standards in which x-ray measurements and the necessary instruments could be standardized.

Similar Committees in other countries, notably in France and in Germany, were working on the same problem and produced units of measurements which were different from each other. At the time of the First International Congress, one of the problems of immediate importance was the establishment of a unit of measurement of x-rays which could be understood and reproduced in all countries. During this First Congress a combined meeting of the Sections on Physics and on Therapeutic Radiology was held to discuss the establishment of an International Unit of Measurement.

At the suggestion of Antoine Beclere of Paris, a Committee was appointed to nominate qualified physicists and radiologists from various countries for membership on an International Committee to which was assigned the problem of developing a unit of measurement suitable for use throughout the world. Accordingly, Thurstan Holland appointed "The International X-Ray Units Committee" with instructions to report at the next Congress.[1]

The International X-Ray Units Committee made its first report in 1928 at the Second Congress in Stockholm, and established the "roentgen" or the "r" as the "unit of x-radiation" which could be reproduced in all countries. It was promptly adopted internationally and with minor modifications is still in use. This Committee later became known as the International Commission on Radiological Units (ICRU), which in 1953 established the "rad" as the unit of absorbed dose of radiation.

The International X-Ray and Radium Protection Committee was organized at the Second Congress in Stockholm under essentially the same arrangements which prevailed when the Units Committee was appointed in London three years earlier. This Committee later became the International Commission on Radiological Protection (ICRP).[2] The latest report of this Commission was adopted September 9, 1958.[3]

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[1] Taylor Lauriston S. History of the International Commission on Radiological Units and Measurements (ICRU), Health Physics, 1958 *1*, 306-314.

[2] Taylor, Lauriston S. History of the International Commission on Radiological Protection (ICRP), Health Physics, 1958, *1*, 97-104.

[3] Recommendations of the International Commission on Radiological Protection, New York, Pergamon Press, 1959.

It is important to emphasize that the members of both of these Committees are selected and appointed on the basis of their individual qualifications for the work to be done, without political considerations.

Because of the difficulty of comparing the results of radiation therapy of malignant diseases in different countries, an International Commission on the Staging of Cancer (ICSC) was appointed in 1950. Its purpose was to establish criteria for the classification of malignant diseases which could be used in reporting the results of treatment. Thus the therapeutic results of one writer might be comparable with those of another. The Chairman was Professor James Heymann of Stockholm. Following his death, Professor Hans Schinz of Zurich became Chairman.

At the Ninth Congress in Munich, an International Commission on Rules and Regulations (ICRR) was established, the purpose of which is to revise the basic regulations which control the activities of the Congresses, with Ross Golden as Chairman.

International Society of Radiology.—The International Commissions had been meeting immediately before and during each Congress. These Commissions had so much to do that extremely long, fatiguing sessions had to be held. This led Professor Heymann to suggest to the International Executive Committee in 1953 that arrangements should be made for the International Commissions to meet during the three year interval between Congresses when the Chairmen found such meetings necessary. Interval meetings would require financial support. As a mechanism for supporting these Commissions, an International Society of Radiology was proposed which should have a membership of National Radiological Societies rather than of individuals and should establish a headquarters office. The dues paid by member-societies should be used only for the support of these International Commissions. The work of the Commission on Protection as well as on Units had become of increasingly great importance following the development of artificial radioactivity. Efforts had been made by some of the pseudo-governmental international medical and scientific organizations to get control of these Commissions which were originally established by the International Congress through the cooperation of radiologists from many countries. Had this happened, control of these Commissions and of the appointment of their members would have been lost to international radiology.

For these reasons, the International Committee at the Seventh Congress in Copenhagen approved the International Society of Radiology (ISR) in principle and appointed an International Organizing Committee to prepare "Statutes" under which the new organization could operate.

At the Eighth Congress in Mexico, the International Committee adopted the "Statutes" prepared by the International Organizing Committee and the ISR began to function. Its President is the President of the Congress. Its ultimate authority is the "Assembly" which is composed of Chairmen of the Delegations of all countries which have dues-paying member-societies. The "Council" is made up of members of the International Executive Committee and acts as a steering committee. In addition, a "Working Committee" of three members of the Council is at the disposal of the President for the purpose of making decisions between regular meetings of the Assembly which are three years apart.

Professor Flemming Norgaard, Secretary General of the Seventh Congress, was appointed Secretary-Treasurer of the ISR. His office, in Copenhagen, Kommunehospitalet, Denmark, became the headquarters office.

Following the second World War, the *Council for International Organisations of the Medical Sciences* (CIOMS) was established with headquarters in Paris. The function of the Council is to correlate and to assist International Medical meetings. As of 1950, the International Congress of Radiology was represented on the CIOMS by Ralston Paterson, President of the Sixth Congress. At present Henri Maisin, a Belgian therapeutic radiologist, is Chairman of its Executive Committee and Ralston Paterson is a member. International Radiology is, therefore, well represented World Health Organization and United Nations Educational Scientific and Cultural Organization, as well as other International Organizations, are represented on the CIOMS.

In 1957 Professor Flemming Norgaard, Secretary-Treasurer of the ISR, was requested to describe the structure and purposes of the ISR to the CIOMS. The ISR was requested to replace the International Congress of Radiology as a member of the CIOMS. This Council has, in the past, made financial contributions to the Congress, in particular to support certain special conferences. In previous years, the Congresses have made small contributions to the CIOMS. Now that the ISR is the representative of world radiology, it will be expected to contribute subscriptions of three hundred dollars per year to the CIOMS which is actually considerably less than the contributions of the CIOMS to the Congress. Representation on the CIOMS is of great importance to International Radiology.

At the time this is written, the ICR had member-societies in thirty-four countries. The dues are twenty-five cents United States money, or its equivalent in any national currency, per dues-paying member of each member-society. Sufficient money had been received by the summer of 1958 to permit the payment of five hundred dollars to each of the three Commissions, the ICRU, the ICRP and the ICSC. Obviously, this is only token support for these important Commissions from International Radiology. However, this support has proved to be of great importance. These Commissions must obtain much larger sums of money from certain Foundations and elsewhere.

Lauriston S. Taylor, Ph.D., Chairman of the ICRU and member of the ICRP, explained to the Board of Chancellors of the American College of Radiology that the International Congress, which meets in a different place once every three years without real continuity, was not regarded as stable backing. Dr. Taylor (1958) states "... the ICRP and the ICRU were established, and thereafter sponsored, by the International Congresses of Radiology. In a sense the two Commissions were the only continuing bodies of the Congresses since technically the latter existed only every three years. To some degree this was awkward for the Commissions in that their sponsorship appeared to be uncertain. This situation was alleviated by the organization of the International Society of Radiology in 1956. The society will in the future sponsor ... the ICRU and the ICRP. By its own international character its sponsorship will carry more weight. As a further outgrowth of the new organization, it has made funds available to the Commissions to assist in their work." Dr. Taylor added that, although small, these contributions proved to be helpful in the approach to certain organizations for larger sums of money. The international importance of these Commissions is emphasized by the fact that they are consulted by the World Health Organization, by the United Nations and other International organizations. Although it is still young, the International Society of Radiology, a continuing organization with a headquarters office in constant operation, has already demonstrated its value in assisting these International Commissions and in keeping them under the aegis of Radiology.

Ross Golden, M.D.

Reprinted from the American Journal of Roentgenology, Radium Therapy and Nuclear Medicine, Vol. LXXXV, No. 2, February 1961, Ford foundation grants to the International Society of Radiology for the International Commissions.

The Ford Foundation, on October 10 1960, announced grants to three important international scientific bodies "to help speed up the task of defining, measuring and limiting hazards resulting from man-made radiation." The International Commission on Radiological Units and Measurements (ICRU) received $ 185,000. The International Commission on Radiological Protection (ICRP) received $ 250,000.

The International Bureau of Weights and Measures, established by treaty in 1875, received $ 32,500; this Bureau is not connected with a Radiological Organization but will assist in the development of world-wide standards of radiation measurement.

The ICRU was established by the First International Congress of Radiology in London in 1925 and the ICRP by the Second International Congress of Radiology in Stockholm in 1928. The members of these Commissions are appointed by the International Congresses, with the advice of Radiation Scientists and Medical Radiologists, on the sole basis of competence and without regard to nationality or political governments. Throughout the past three decades the problems submitted to these Commissions have steadily increased in number and importance. Financial support of their work has not been easy to obtain. Their meetings were usually held every three years in association with the International Congresses.

At the Seventh International Congress in Copenhagen in 1953, the need for additional financial support for these Commissions was obvious, particularly to enable them to meet more frequently than once every three years. Furthermore, at this time there was danger of loss of control of these Commissions by Radiology to another international, pseudogovernmental body. To establish clearly the sponsorship of, and to keep the control of these Commissions under Radiology, direct contributions from an International Radiological Organization were needed, which could not be supplied by the International Congress. For these purposes, the International Society of Radiology was proposed; its organization was worked out by an international committee; it was adopted and put into operation at the Eighth International Congress in Mexico in 1956. A secretariat was established in Copenhagen under the supervision of Professor Flemming Norgaard, Secretary-Treasurer.

The ICRU and the ICRP then began to operate under the continuing sponsorship of, and to receive financial support from, the International Society of Radiology, in behalf of National Radiological Societies, called "Member-Societies", in thirty-four countries. The importance to the Commissions of this arrangement was reported

to the Board of Chancellors of the American College of Radiology in 1958 by Dr. Lauriston Taylor, Chairman of the ICRU; this new sponsorship made Foundations and other sources of funds more receptive to requests for aid. The American College of Radiology became the "Member-Society" representing the United States in the ISR.

The above-mentioned grants will be issued in annual instalments of $37,000 for the ICRU and of $50,000 for the ICRP over a period of five years. The announcement of the Ford Foundation, on October 10, 1960, further stated: "The Foundation's new grants will enable three experienced international agencies to broaden their consideration of radiation problems independent of the policies of governments.

"The International Commission on Radiological Units and Measurements and the International Commission on Radiological Protection have been dealing with radiation hazards since the early uses of x-rays and radium in the 1920's. The Commissions are completely independent, and are neither financed nor sponsored by any government or organization of governments. Their members are selected on the basis of scientific ability without reference to the national interests of their home countries.

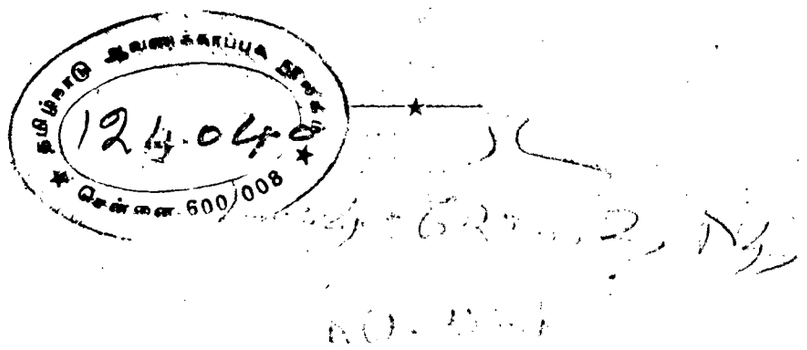
"The work of each Commission is carried out largely by committees of scientists and is coordinated through periodic conferences and an international secretariat. The Foundation's grants will help the Commissions meet the increasing demands for their work and will be used for administrative and publication costs, travel funds, and other expenses.

"During the next few years, the International Commission on Radiological Units and Measurements plans to devote major efforts to developing improved units and methods of measuring radiation received by living matter. The methods now widely used are based on the roentgen, a unit that expresses the quantity of energy emitted from a source as x-rays or gamma rays but is of limited value in measuring total doses of radiation absorbed by living organisms."

"The International Commission on Radiological Protection, through its recommendations of safe levels of radiation exposure, has established the basis for the official standards of radiation protection adopted by many countries. In the light of recent scientific developments, it plans to re-evaluate these recommendations and to publish revisions of them."

Dr. Taylor stated, "An essential ingredient in the build-up of our funds has been, and will continue to be, the small but regular support of the International Society of Radiology."

Ross Golden, M.D.



Second International Congress of Radiation Research

HARROGATE, YORKSHIRE

ENGLAND

5th—11th August, 1962

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The deadline for abstracts, and registration at the standard fee (£ 8 or $ 24), is January 15th, 1962. Please write to the Secretary-General, Mount Vernon Hospital, Northwood, Middlesex, England. Congress headquarters will be the Majestic Hotel, where many of the seasons vill be held.

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