154

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Editorial

RADIOLOGY CONSULTANT IN INDIA

The status of the Consultant in Radiology should be in a par with other specialities, if he is to function effectively and advantageously in the profession. In these days when one hears more of rights than responsibilities, it will be truism to state that to a great deal, the status of the Consultant in any speciality depends upon his knowledge, experience, skill and to the extent to which he can aid other colleagues in the profession in the diagnosis and treatment of diseases. It is regretted that there still exists some lacunae in our country in understanding the role of a Consultant Radiologist. A leading physician or surgeon sometimes compliments a radiologist as good, because he takes good radiographs. But, to confuse a radio-diagnostician as a mere technician is unreasonable, even though a good picture helps in radio-diagnosis. Medical radiology is more than a clinical speciality. It looms rather as a Philosophy of Medicine, a particular point of view to be employed advantageously in the attack in almost every conceivable problem encountered in the practice of medicine. Radio-diagnosis is autopsy in vivo with its foundations firmly laid on anatomy, pathology and physics. To see that good technique is employed is one of the responsibilities of a radiologist. But it must not be forgotten that this aspect is only a small part of his big responsibility towards his medical colleagues. The duties and responsibilities of a Consultant Radiologist have been ably discussed in his masterly editorial of Robert S. Sherman, M.D. of the Memorial Center, New York, N.Y. in the August Issue, 1960 of Radiology. "The rendition of a signed report to the referring physician is an important part of practice of Diagnostic radiology. This report, based on the examination of the patient presents the findings of the Roentgenologist and expresses his medical judgment or diagnosis. Because definite responsibilities have been assumed in the performance of such an examination, no matter how simple it may be, the report should show that these commitments have been honoured" (Robert S. Sherman). So, the medical colleagues should assess the merit of the radiologist on the basis of his signed report on the diagnosis of the case rather assuming more on the technique of the radiograph, even though it forms a small part. Medical Science has grown so enormously that it is impossible for any single medical man whatever may be the capacity to be a master of all branches. Reading and Interpretation of Radiographs are the prime functioning of the Radiologist, but unfortunately the habit of years

ingrained and rooted in the minds of our colleagues in other branches of medicine is rather hard to overcome, some of them still think that it is for them to make the diagnosis. It is better for the physician or surgeon to be guided by the specialist opinion given by his radio-diagnostic colleagues than to rely entirely in his judgment by looking at the radiograph himself. (This part of my opinion does not apply to the good majority of his colleagues who give due respect to the opinion of his radio-diagnostic colleague). A complete radio-diagnostician's signed report consists of six sections, namely, (1) Evaluation, (2) Detection, (3) Description, (4) Comparison, (5) Diagnosis and (6) Recommendation.

Evaluation.—Generally an evaluation consists of an assessment as to whether the proposed X-ray examination is suitable for the stated purpose, thoroughness of execution and the technical quality. In a particular situation, a consultation between the referring physician and the radiologist as to the correct X-ray procedure will produce rich dividends. If that is not possible, the X-ray diagnostician being informed of the problem to be answered is given free choice to choose the most efficient way to proceed with his technique.

Detection of the abnormality or lesion or its exclusion constitute the most important contribution of the radiology consultant. Not only the lesion must be discovered either in the radiograph or screening but its potential significance must be detected and reported.

Description.—"Roentgenologic Description" is indeed a difficult art and it constitutes a major part of competent reporting. Technical jarga is to be avoided. Description should be accurate and lucid using acceptable language in anatomy, physiology and pathology.

Comparison with related previous film should be carried out.

Diagnosis.—On the basis of detection, description and understanding of pertinent clinical data, and his previous experience, the possible diagnosis is offered.

Finally, "a recommendation for additional film", special studies and comparison with other films completes the radiologist's report. This report is the sheet anchor of his medical responsibility to his medical colleagues as well as his patients and must be given all the attention and regards due to a specialist's considered opinion.

Another difficulty that the radiology consultant in India experiences is the question of fees. Fees should be charged for the investigation carried out and opinion given and not on the number of radiographs taken. This question has been ably discussed by Dr. Gadekar in his presidential address at the 8th Indian Congress of Radiology held in Madras in 1955. What one radiologist can decide with two radiographs, another may require ten and depends upon his skill, experience and judgment. Question of charging according to the number of radiographs taken savours commercialisation of medical practice and should be avoided. The tendency to become a minor partner in a great practice, split fees and similar temptation should be curbed in view of the high ethics and sacred trust of a medical consultant. A radiologist must not only be a competent person in his own field but has to be conversant with the general principles of many other fields so as to be most useful to his colleagues. For example, a radio-therapist should have at least a working knowledge of other branches as Surgery, Gynaecology, Ophthalmology, Laryngology, Medicine, etc. After his long and arduous training and heavy responsibilities, it is but just that his or her status and remuneration must be at a par with other major specialities as Surgery, Medicine or Gynaecology. Otherwise the speciality will not attract competent persons resulting in lowering the standards in this medical speciality in our country.

We urge the Consultant Radiologist in India to be alien to their onerous and heavy responsibilities and ethics in the discharge of their duties inspite of the many handicaps under which they suffer at present, so that correct and efficient standards of special consultant be established in our country. In the exciting and great adventure of building a New India, our Motherland expects, every son and daughter to do his or her duty irrespective of the reward due. It is hoped that a radiologist will not lag behind in this sacred task.

A. N. K. Menon.

The Laurence-Moon-Biedl Syndrome

(Review of Literature and a case report)

BY

N. G. GADEKAR, S. CHAWLA*

AND

K. P. S. VERMA, B. N. S. WALIA and P. N. TANEJA†

Historical

The association of obesity, po'ydactyly and poor eyesight was recorded for the first time by Laurence and Moon in 1866.[11] Stor in 1865[19] had reported cases of retinitis pigmentosa combined with other anomalies, which were probably unrecognised cases of the syndrome. Biedl in 1921,[3] described the pentad of obesity, retinitis pigmentosa, hypogenitalia, mental deficiency and polydactylism and emphasised its familial occurrence. Solis-Cohen and Weiss[17] proposed the term "Laurence-Moon-Biedl Syndrome" in 1924 when they reviewed the available literature. Excellent reviews on the subject were subsequently published by Cockayne et al[5] (1935), Sorsby et al[18] (1939) and Burn[4] (1950). Amongst the cases reported from India, those of Kutumbiah and Abbu[9] (1942), Nandi[14] (1949) and Laha[10] (1958) deserve mention.

Components of the Syndrome

1. *Obesity* is a prominent feature in most cases and was detected in 88% of the cases reviewed by Burn[4]. The fat distribution is of the pituitary type, being more marked on the trunk.

2. *Hypogenitalism.*—This component is met with less frequently than obesity and was detected in 61%[4] of the cases. The lesser incidence is explained by the difficulties of assessment in the younger age group and from the lack of follow-up of the cases.

3. *Polydactyly and syndactyly.*— Anomalies of the extremities described vary from complete sypernumerary digit to irregularity in the lengths of the metacarpals, in-curving of the little finger, syndactyly etc. The extra digit is said to be usually situated, near the smallest finger or toe-likins[18] (1947).

4. *Eye-changes* are recorded in roughly 90% of the cases. Visual disturbances are stated to manifest themselves by the 5th year in the form of night blindness. The commonest abnormality reported, is some variant of the classical picture of retinitis pigmentosa. Charles Taylor[20] (1947) reported atypical retinitis pigmentosa associated with macular dystrophy in a case of Laurence-Moon-Biedl Syndrome. Other ocular defects described include nystagmus, strabismus, myopia, microphthalmos and optic atrophy.

5. *Mental deficiency.*—Varying grades of mental deficiency are often found, associated with the syndrome. It was found in 58 of the 82 cases reviewed by Burn.[4]

Associated Anomalies may involve the skeletal system producing pes planus, kyphosis, scoliosis and high arched palate etc.

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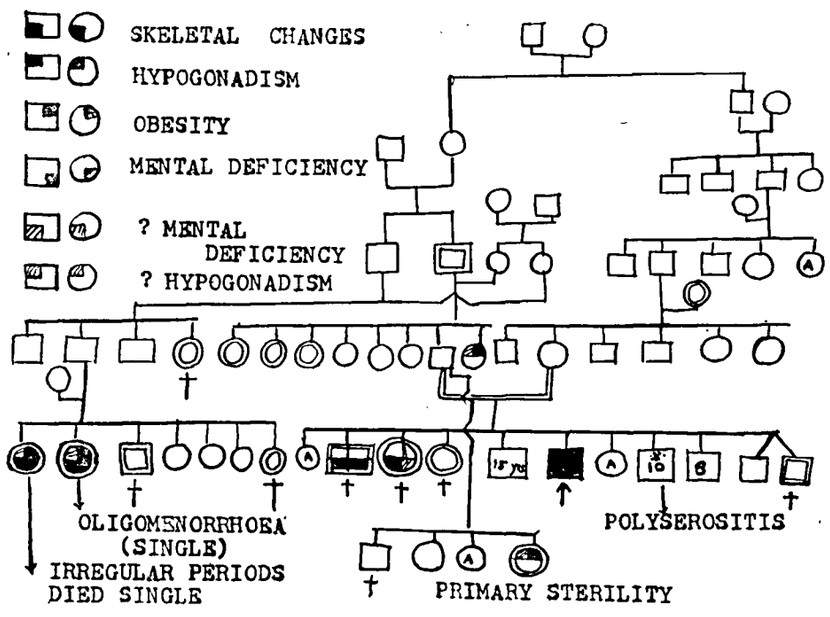
Mann reported in 1937, oxycephaly, as one of the skeletal abnormalities which may be present with the syndrome. Abnormalities of the central nervous system which are occasionally associated, include ataxia, cerebellar syndromes, epilepsy etc. Occasionally, the metabolic disturbances like diabetes insipidus, diabetes mellitus have been found to co-exist. E. Jaso et al[8] (1945) described 3 cases of L.M.B. Syndrome who had associated hypothyroidism.

Etiology

The syndrome is of a familial character though different components may have varied grades of expressivity. Though the syndrome can affect both sexes, it is commoner in the males.

A higher incidence of the syndrome has been demonstrated in Co-sanginuous marriages - Fraser Robert.[7] The exact mode of genetic transmission is not clearly understood. While, Warkany et al[21] (1937) believe it to be a chance occurrence, Fraser Robert[7] postulates that the syndrome is due to a single recessive autosomal mutant gene with multiple defects. Cooperstock[6] (1937) on the other hand, advanced the theory that the various components of the syndrome represent mesoblastic (polydactylism) and epiblastic (obesity, retinitis pigmentosa, mental inferiority and genital dystrophia) defects, which are recessive and due to mutation of two genes in the same chromosome.

Though often Pituitary has been blamed-Anderson[2] (1941) pathological evidence of pituitary abnormality has generally been inadequate.



Case Report

H. R. 13 years, Male was admitted to the Paediatric Ward of the All-India Institute of Medical Sciences Hospital on 26th August, 1960 with the complaints of obesity, undescended, testes, night blindness and unsatisfactory progress at school. Antenatal, natal and postnatal periods were uneventful. Milestones were definitely delayed, the child started sitting at 1½ years, walking at 3 years and talking at 3½ years.

Family history.—Tree of the sibship is attached.

Physical examination

He was a well-nourished, rather obese young boy, who had the following clinical features:

Height.—150 cm., Weight - 105 Lbs. Skull-markedly scaphocephalic, circumference—57 cms., face-pear-shaped and lower jaw rather small, palate - high arched.

Hands were square and showed polydactyly. The rudimentary 6th fingers were attached to the little fingers of both hands.

Feet showed valgus deformity and a combination of syndactyly and polydactyly.

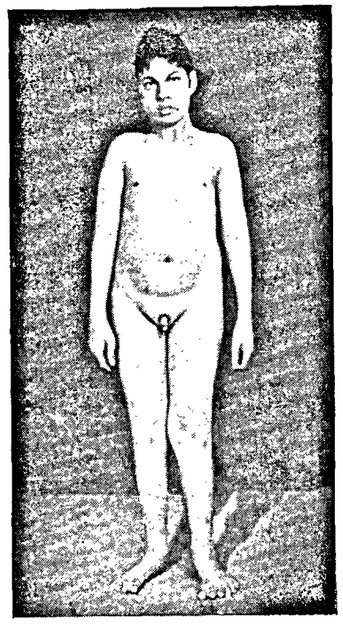


Fig. 2

Whole body showing obesity and hypogenitalism.

Fig. 3

Hands and feet showing syndactyly and polydactyly.

Fig. 4

Skull: showed marked scaphocephaly. The phella is widened and flattened clinoids both anterior and posterior were thinned and the whole sella seems to be embedded in the sphenoid sinus. The mastoid aircells are not pneumatised.

Genitalia **both testis were undescended with few sparse pubic hair and an infantile, penis.**

Obesity was more remarkable on the trunk. The child was euphoric and extrovert with an I.Q. of 84. Eyes showed microcornea and the child had defective vision in the dark.

Fundus examination did not reveal retinitis pigmentosa. Perimetry revealed a generalised constriction of the fields of vision in both eyes of a mild degree. There were no ocular or cutaneous manifestations of vitamin A deficiency. B.M.R. - 2. 17 Ketosteriod excretion - 1·216 milligram in 24 hours. All other systems and laboratory investigations were normal.

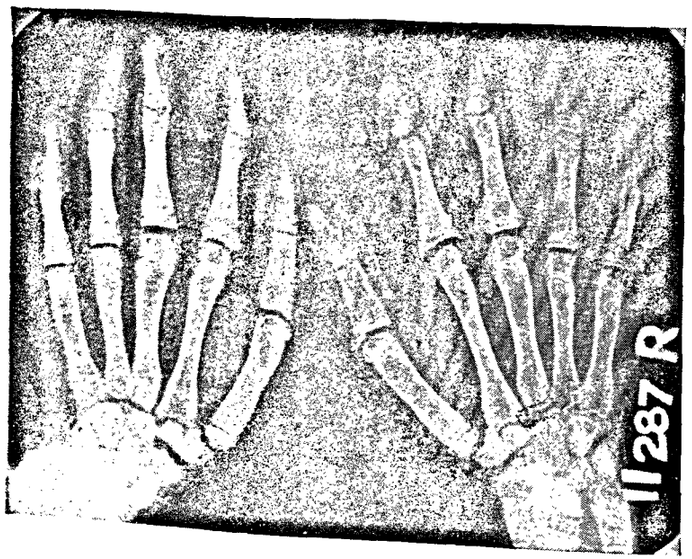


Fig. 5

Hands, show extremely small middle phalanx in all the fingers with a small rudimentary digit attached to the little finger on both sides and there is syndactyly in both hands.

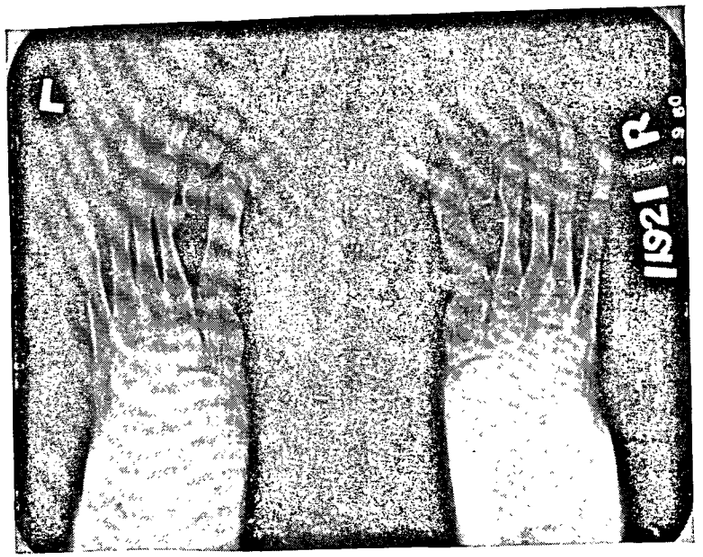


Fig. 6

Feet: show polydactyly. The extra digits were in association with the rudimentary Metatarsals which were in between and first and the second metatarsals on both sides. The rudimentary metatarsals were attached to the necks of the second Metatarsals. As in the hands, the second phalanges were markedly shortened. Intra-venous pyelogram was normal.

Discussion

Presenting as a case of multiple congenital abnormalities, namely, Polydactyly, Syndactyly, high arched palate, microcornea, night blindness, Pes Planus, scaphocephaly and genu valgus in association with obesity, hypogenitalism, and mental deficiency, the case fulfils 4 components of the Pentad, that is widely accepted under the name of Laurence-Moon-Biedl Syndrome. Since the mode of inheritance is most often due to an autosomal recessive trait,[1] of varying penetration, the expressivity rate of different components is bound to be variable. In view of the above circumstance, opinions have been voiced that cases possessing even a triad should merit the same title. Reilly and Lisser[16] reviewing the literature in 1932 found that the complete syndrome was present in only 25 of the 75 cases. 89% of the cases reported by Burn[4] showed retinitis pigmentosa and it is well known that pigmentary changes in the retina may appear many years after night blindness-Parsons[15] (1948). Mann[13] described Acrocephaly in a child with Laurence-Moon-Biedl Syndrome. The occurrence of scaphocephaly is easily understandable, but the anomaly has not been previously reported in the literature.

Summary

1. A case of Laurence - Moon - Biedl Syndrome is reported.

2. Literature on the subject is reviewed.

REFERENCES

1. Anderson, G. H.: Laurence-Moon-Biedl Syndrome, B.M.J. 2: 517, 1948.
2. Anderson, N. L. J.: Clinic, Endocrinol. 1: 905, 1941.
3. Biedl, A. and Raab, W. quoted by Anderson, B.M.J. 2: 517, 1948.
4. Burn, R. A.: Deafness and L. M. B. Syndrome, B. J. Opth. 34: 65, 1950.
5. Cockayne, E. A. Krestin, D. and Sorsby: Quart. J. Med. 4: 93, 1935.
6. Cooperstock, M.: Laurence Moon Biedl Syndrome, Am. J. Dis. Child, 54: 334, 1937.
7. Fraser-Robert, quoted by Burn, B.J. Opth. 34: 65, 1950.
8. Jaso, E. and Arabelo Curbelo, A.: Am. J. of Dis. Child, 70: 9, 1945.
9. Kutumbiah, P. and Abbu, C.: Indian J. Paediatrics, 9: 120, 1942.
10. Laha, P. N.: Indian J. Paediatrics, 25: 246, 1958.
11. Laurence, J. Z. and Moon, P. C.: cited by Burn B. J. Opth. 34: 65, 1950.
12. Likins, C. H. Jr., Scott, E. P. and Mandelman, N. I.: Am J. Dis. Child, 73: 195, 1947.
13. Mann, J.: "Developmental abnormalities of the eye", Cambridge, P. 193, 1937.
14. Nandi, A. K.: Indian Medical Gazette, 186, May 1949.
15. Parsons, M. J. and Duke Elder Stewart: "Diseases of the Eye", J. A. Churchill Ltd., London, 1948.
16. Reilly, W. A. and Lisser, M.: Endocrinob, 16: 337, 1932.
17. Solis-Cohen, S. and Weiss, E.: Am. J. M. Sciences, 169: 489, 1925.
18. Sorsby, A. Querg, M. and Cockayne, E. A.: Quart. J. Med. 8: 51, 1925.
19. Stor, Klen, Monasbl. Augenleik, cited by Burn, B. J. Opth. 34: 65, 1950.
20. Taylor, C.: B. J. Opth. 31: 211, 1947.
21. Warkany, J. Francuberger, G. S. and Mitchell, A. G.: Am. J. Dis. Child, 53: 455, 1937.

Symposium on Common Congenital Cardiac Anomalies

(Radiological Aspect)

BY

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The importance of precise diagnosis of Congenital Cardiac lesions has been brought into a focus since surgical correction for many of these lesions has become a reality.

The following are some of the common congenital cardiac lesions with are amenable to surgery.

Table I

Cardiac lesions that can be corrected

1. Co-arctation of the aorta.
2. Patent Ductus arteriosus.
3. Inter atrial septal defect.
4. Interventricular septal defect.
5. Pulmonary stenosis.
6. Total anomalous pulmonary venous return.
7. Partial anamalous venous return.
8. Tetralogy of fallot.
9. Cardiac tumours.
10. Congenital ventricular aneurysm.

Table II

Cardiac lesions that can be ameliorated.

1. Tricuspid atresia.
2. Congenital aortic stenosis.
3. Mitral Stenosis.
4. Mitral insufficiency.
5. Transposition of the great vessels.

Roentgenological evaluation of congenital heart lesions is the most important single diagnostic tool available. However this field has been considered in the past, a particularly difficult and even exasperating area because of the multiplicity of diagnostic possibilities, and lack of pathognomonic signs. The purpose of this paper is to suggest a method of analysis of fluorscopic and radiographic findings with a resort to contrast cardiac investigations as angiocardiography and retrograde aortography when definitely indicated.

This approach is based on the Roentgen manifestations of pathologic anatomy and physiology and is an attempt to relate the pathology to the films. The emphasis on this paper will be the conventional roentgenological examination utilising the tools available to all radiologists. But a brief discussion to indicate the place of special techniques such as angiocardiography, retrograde aortography, selective cine-angiocardiography and cardiac catheterisation is attempted.

Classifications.—The usual clinical classifications of heart disease is to divide it into congenital and acquired heart diseases and to classify the congenital variety *into cyanotic and acyanotic groups*. This is the Maude Abbot's classification. The advantage of this division into cyanotic and acyanotic types is that it separates the patients into great physiological groups.

Clinical cyanosis indicates systemic oxygen desaturation. However there are several disadvantages to this classification

from the clinical and particularly from the radiological point of view.

(1) Five grams per cent of desaturated blood must be present in the peripheral circulation before the patient is visibly cyanotic.

(2) Some patients with a cyanotic heart disease may be cyanotic as a result of failure of other mechanisms. In a series of thirty infants under the age of one year with severe coarctation of the aorta half had a history of cyanosis.

(3) Finally cyanosis is not a radiological criterion and in many cases one cannot be certain as to the presence or absence of cyanosis when fluoroscopying or viewing films.

Hence a classification has been devised by the Minnesota School of Radiologists in U. S. A. that permits an objective division into groups on the basis of roentgen criteria.

Thus patients with congenital heart disease are divided into groups according to the pulmonary arterial vasculature, *that is increased, normal and decreased PULMONARY arteries*. This classification, too is based on an important physiological differentiation namely the blood flow through pulmonary vascular circuit.

A. Patients with increased pulmonary vasculature

Sub group I.—Within the group of patients with increased pulmonary vasculature there is a subdivision of significance from the point of view of differential diagnosis.

(1) one sub group, by far the largest has increased pulmonary vasculature as a result of an intra cardiac or extra cardiac left to right shunt. In this group there is increased pulmonary vasculature with a convex pulmonary artery segment and there is no peripheral desaturation and no cyanosis. The following are the main lesions in this group of increased pulmonary vasculature with enlarged pulmonary artery segment.

1. Patent ductus arteriosus.
2. Inter atrial septal defect.
3. Interventricular septal defect.
4. Atrioventricularis communis.
5. Aortic pulmonary window.
6. Corrected transposition from left to right shunt.
7. Partial anomalous pulmonary venous return.
8. Lutembacher's syndrome.

Lesions with increased pulmonary vasculature on the basis of left to right shunt constitute more than 50% of all the patients with congenital heart disease. Mostly, it is made up by the four common left to right shunts namely :

(*a*) patent ductus arteriosus (12%).

(*b*) interventricular septal defect (maladie-de-Roger 20%).

(*c*) inter atrial septal defect (11%) and

(*d*) atrioventricularis communis (4%).

According to Bedford in England atrial septal defect constitute about 20%. All cases of left to right shunt with the exception of corrected transposition show enlargement of the pulmonary artery segment as well as that of the branch arteries. This enlarged pulmonary artery segment helps one to differentiate this group from admixture lesions in which the pulmonary artery segment is usually although not invariably is relatively flat or concave.

(a) Patent ductus arteriosus (12%). In about 1/3 of these case the clinical diagnosis is usually easy when a characteristic machinery murmur accompanied by the systolic thrill is present.

Plain x-ray signs

(1) *Relatively large aortic arch.*—While this may be difficult to appreciate in films of childhood age, fluoroscopy usually demonstrates a large actively pulsating aorta. Right ventricular enlargement, moderate enlargement of the left ventricle and often left atrial enlargement will be present. In questionable cases, angiocardiography, cardiac catheterisation or retrograde aortography will clinch the diagnosis.

Angiocardiographic signs.—In 2 to 3 seconds radiograph right heart and pulmonary arteries will be distinctly opacified. In 5 to 6 seconds radiographs pulmonary artery (arteries) become reopacified from the aorta and once more stands out clearly. In LAO position localised dialatation of the descending aorta directed towards the pulmonary artery. In retrograde aortography the contrast medium may be seen entering from the aorta into the pulmonary artery through the ductus. The site and extent of the ductus may be clearly visualised.

I am showing slides or radiographs of 3 cases of patent ductus arteriosus.

Case I.—(Slides No. 2, 2-a, 2-b), PA, RAO and LAO radiographs or Radiographs).

Pushpam female - age 20. Please note the aorta and enlarged pulmonary artery segment in PA view and enlarged left ventricle in the LAO view.

Case II.—(Slides 3 and 3a) PA and RAO view radiographs, S. Srinivasan - 25 male - machinery murmur (24-2-47) PA view shows enlarged aortic arch and enlarged pulmonary segment. RAO view radiographs confirms enlarged aortic arch.

Case III.—(Slides 9 to 15) Miss Leelavathy.

PA view radiograph shows conspicuous aorta and pulmonary artery segment and increased pulmonary vasculature. LAO view radiograph shows moderate enlargement of the left ventricle.

Angiocardiographs show at 0·6 seconds right heart and pulmonary arteries distinctly opacified. At 3·6 seconds radiographs show pulmonary artery getting reopacified from the aorta and stands out clearly.

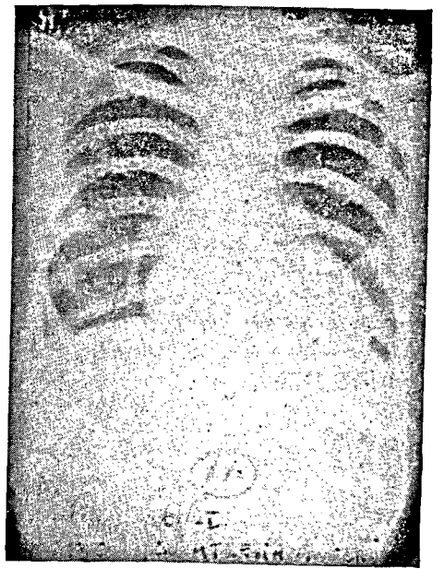
(b) *Interaventricular septal defect.*—(Maladie de Roger) 20% of congenital cardiac anamolies as per Minnesota School of Radiology. As an isolated defect it is usually symptomless but clinically has a distinctive sign of a rough systolic murmur occasionally accompanied by a thrill in the third and fourth left intercostal spaces.

Plain x-ray signs.—Increased pulmonary vascularity with enlarged pulmonary artery segment. Aorta appears small, inconspicuous and inactive thus differentiating from patent ductus. There is some enlargement of the right ventricle. There may be some enlargement of the left auricle thus differentiating from atrial septal defect.

Angiocardiography shows re-opacification of the right ventricle after 5 seconds.

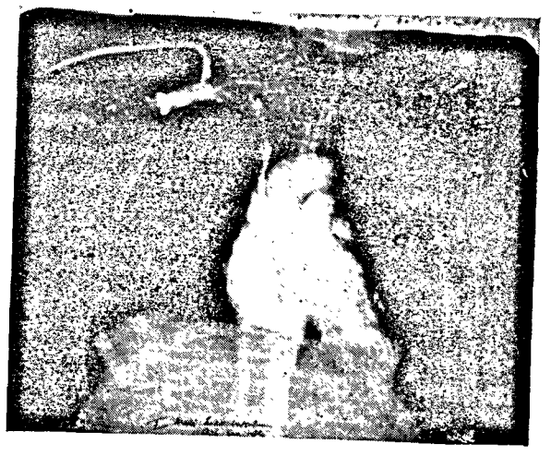
Case I.—Chelladurai (Slides 6A and B) shows enlargement of right ventricle and pulmonary artery segment.

(c) *Inter atrial septal defect.*-According to Minnesota School of radiologists this constitute about 11% of congenital cardiac anomalies. According to Bedord it is commonest of the



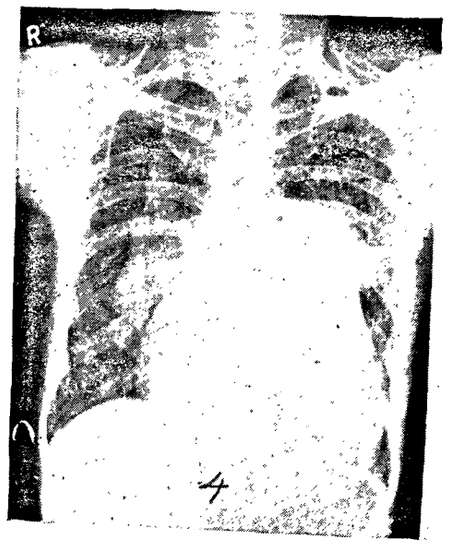
Case I

Tricuspid Atresia PA view Diminished Pulmonary Vasculature Enlarged Left Auricle.



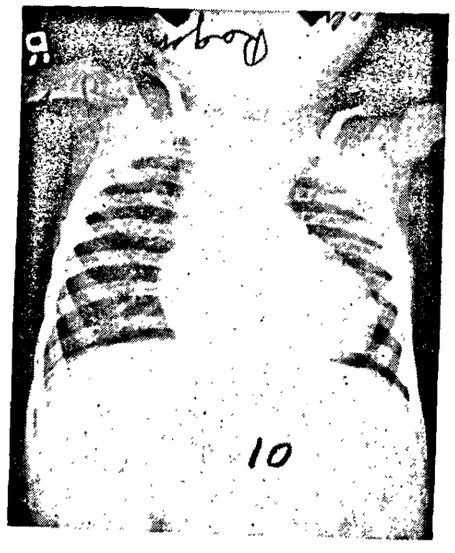
Case I

Tricuspid Atresia Case I Govinda Raj Angiocardiograph. Simultaneous opacification of RA. LA & LV notch like filling defect at the midline diap hargmatic surface is due to small unfilled R.V.



Case I

Atrial septal defect Gangiah Case I Typical enlargement of main pulmonary artery and right main branch.



Case II

congenital heart diseases due to defective union or malformation of all the three embryonic layers forming the inter atrial septum in contrast to patent foramen ovale which occurs in about 30% of necropsies.

Plain x-ray signs

(1) Presence of cardiomegaly chiefly to the left due to displacement of the left ventricle by the enlarged right ventricle. There is enlargement of the right auricle. But there is no enlargement of either the left auricle or the aorta.

(2) The pulmonary artery segment shows gross dialatation (aneurysmal ?) giving rise to the characteristic appearance of this condition. The main trunk of the pulmonary artery as well as the secondary and tertiary branches appear enlarged.

(3) The right main branch of the pulmonary artery shows gross dialatation and forms a large dense, often comma shaped shadow at the right hilum.

(4) Increased pulsation in the pulmonary vessels and hilar dance due to pulmonary artery insufficiency.

When complicated by rheumatic mitral disease left auricle enlarges and forms Lutembacher's sydnrome.

Angiocardiography.—The defect itself may be seen on the first film of the series in the LAO projection and with partial filling of the left auricle cardiac catheterisation gives a definite diagnosis.

Case I.—Gangiah, Slide 4, Aneurysmal enlargement of the main pulmonary artery segment. Typical gross enlargement of the right main branch of the pulmonary artery. Enlargement of the second and third divisions of the pulmonary arteries. Cardiomegaly chiefly towards the left. Aorta is inconspicuous.

Case II.—Dharmalingam, Slide 5—Typical plain x-ray signs of atrial septal defect.

Case III.—Slide 5B, Angiocardiographic appearance of atrial septal defect. Filling of the left auricle through the defect from the right auricle is clearly seen.

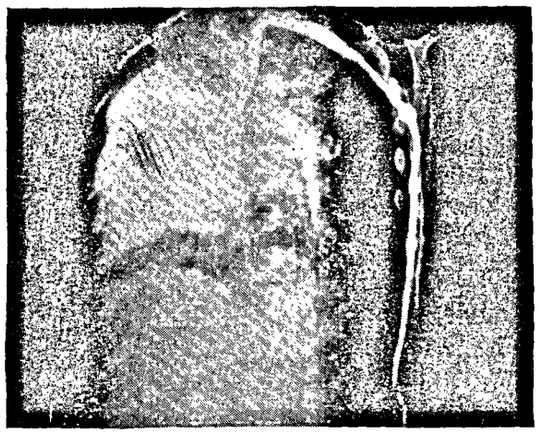
(d) Atrioventricularis communis. (4% of congenital cardiac anamolies) Heart catheterisation shows the shunt at the atrial level.

Sub group II, Admixture lesions.—In this sub group there is increased pulmonary vasculature but there is a flat or convave pulmonary artery segment mostly due to malposition of the great vessels. This group is made up of admixture lesions where oxygenated and deoxygenated blood is mixed together, the resultant blood going both to the systemic and pulmonary circuits—cyanotic.

The following are the chief admixture lesions :—

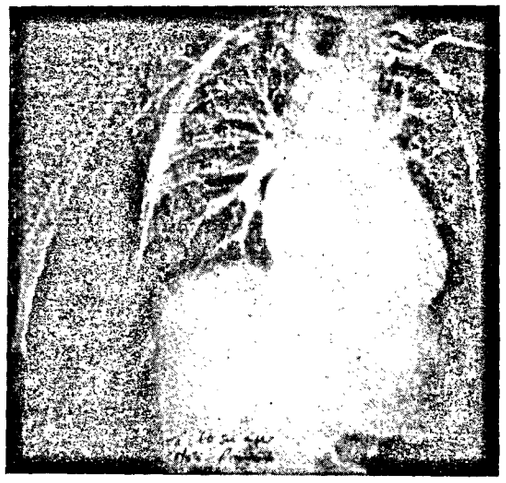
1. Transposition of the great vessels.
2. Truncus arteriosus.
3. Single ventricle.
4. Car biloculare.
5. Taussig - Bing anomaly.
6. Total anamalous venous return.
7. Tricuspid atresia with transposition of the great vessels.

Transposition of the great vessels and Truncus arteriosus are the two most common admixture lesions. Differential diagnosis between these lesions by conventional roentgen methods may be very difficult but angiocardiography will give the answer. In classical cases of transposition in infants show a strikingly narrowed base of the heart which is due in part to the altered relationship of the great vessels to one



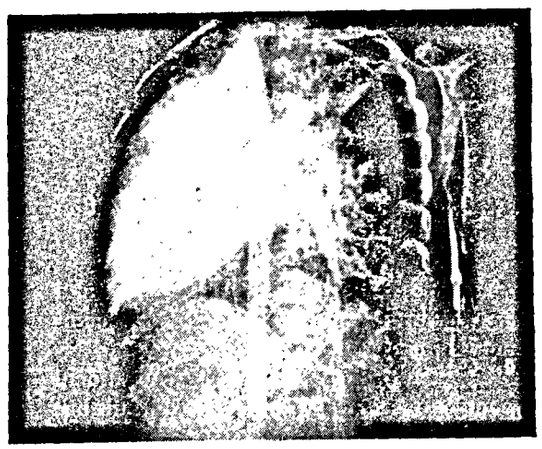
Case III

Miss Leelavathy Patent Ductus Arteriosus Angiocardiograph 0·6 seconds. Right Heart and pulmonary arteries are distinctly opacified.



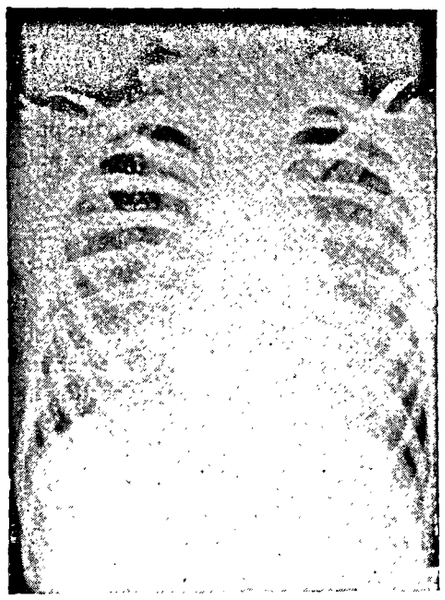
Case III

Pradeep Kumar Fallot's Tetralogy simultaneous opacification of the pulmonary artery and aorta infundibular stenosis.



Case III

Miss Leelavathy Patent Ductus Arteriosus Angiocardiograph 3·6 seconds. Pulmonary artery getting reopacified from the aorta through the patent ductus.



Case III

Patent Ductus Arteriosus Case III Miss Leelavathy PA view radiograph.

another and in part due to striking absence of thymic tissue. Truncus arteriosus usually presents as a large vessel from the heart and the pulmonary artery may at times be seen arising from the trunk.

Case 1, Admixture lesion.—Antony - 6 months child 2 months old dyspnoea and cyanotic cough and fever - palpable liver - Rales at both bases - systolic murmur all over the precordium.

Slide 6c - Plain x-ray finding.—Increased pulmonary vasculature with a flat pulmonary artery segment - admixture lesion.

A. Sub group III.—In this group there is increased pulmonary vasculature but with desaturation or cyanosis and there is right to left shunt of blood on the basis of pulmonary hypertension. The chief lesions in this group is (1) the reversing patent ductus arteriosus and (2) Eisenmenger's complex.

Case I, Eisenmenger's complex.—Pulmonary artery segment convex pulmonary hypertension - ventricular septal defect - overriding aorta - Enlarged right ventricle.

Angiocardiography.—Simultaneous opacification of pulmonary artery and aorta. Enlarged PA segment - Hypertension of the pulmonary arteries, slide 6d.

Group B, Lesions with normal pulmonary vasculature.—Congenital heart diseases in this group consist of:

1. Coarctation of the aorta.
2. Subendocardial fibroelastosis.
3. Isolated valvular pulmonary stenosis and
4. aortic stenosis.

Dextrocardia with or without situs inversus can also be included in this group. Dextrocardia is diagnosed by the demonstration of a mirror image of the normal heart in plain radiograph. In Kartengner's syndrome it is associated with bronchiectasis. Slide 7A. Dextrocardia with bronchiectasis.

Annamma female, Dextrocardia with bronchiectasis at the right base of the lungs. The most common lesion *in this group is the coarctation of the aorta* where there is stenosis of aorta at the isthmus that is where the ventral and dorsal aortae meet in foetal life and also where the ductus arteriosus enters the aorta. There is the infantile and adult types.

Clinical signs.—There are 3 clinical signs of diagnostic importance when the plain radiological signs are not conclusive.

(1) Loss of femoral pulse which is early and constant.

(2) The demonstration of collateral circulation *via* the intercostals by bending the patient forward and viewing the back in good light.

(3) Expansile pulsation are felt in the brachio cephalic vessels.

Plain x-ray signs.—Ascending aorta may be markedly enlarged. Aortic knuckle may be small or absent, hypertrophy of the left ventricle and notching of the lower borders of the ribs (4th to 8th most often) (Roesler's sign) are the plain x-ray signs of the common types. This notching of the ribs is rare in children under six years. In some cases there may be associated patent ductus or interventricular septal defect when increased pulmonary vasculature is seen.

Angiocardiography will demonstrate the site of stenosis in the aorta. Retrograde Aortography is the radiographic procedure of choice in the precise diagnosis of this lesion. The zone of stenosis and the post stenotic dialatation of the descending aorta

may be clearly demonstrated. The collateral circulation through enlarged and tortous internal mammary, intercostal and other communicating vessels may also be demonstrated.

Case I.—Mr. Brown - 20 years.

Slide 7-B.—Enlarged left ventricle and typical Roesler's signs in the ribs are visualised.

Case II.—Ankiah. Loss of femoral pulse clinically made the case one of suspected coarctation even though other plain x-ray signs were like that of double mitral disease.

Slides 7-C.—Retrograde aortography definite shows the site of stenosis with post stenotic dialatation of descending aorta and the collateral circulation very clearly.

(2) In infant age group subendocardial fibro elastosis is indistinguishable from coarctation of the aorta. But retrograde aortography will show a normal aorta in these cases.

(3) Isolated valvular pulmonary stenosis show right ventricular enlargement and marked post-stenotic dialatation of the undivided pulmonary artery. In most cases pulmonary vasculature may be normal. In later stages of this disease there may be relative or even absolute decrease in the size of the pulmonary arterial vessels.

Case 1.—Raman, Angiocardiography.

Slides 42 to 45 shows post stenotic dialated PA and the site of valvular stenosis poorly developed pulmonary peripheral vessels.

(4) *Congenital aortic stenosis* shows an enlarged left ventricle with normal pulmonary vasculature.

Case I.—(slide 8) Rajagopalan.

Plain x-ray findings—enlarged left ventricle in LAO view and moderately prominent aorta.

C. Lesions with decreased pulmonary vasculature

Patients with decreased pulmonary vasculature have a right to left shunt and are cyanotic. Tetralogy of fallot and Tricuspid atresia are the most frequent lesions met in this group. Triology of fallot occurs much less frequently. The most important lesion in this group is the tetralogy of Fallot which consists of pulmonary stenosis usually infundibular, a high interventricular septal defect, a functionally over riding aorta and a right ventricular hypertrophy. Aorta may be normal in position anatomically and apparent over riding is due to high inter-ventricular septal defect in the presence of right ventricular enlargement. It constitute about 75% of the cyanotic congenital cardiac anomalies.

Plain radiographic signs

(1) Heart size may be normal or there may be enlargement towards the left due to the displacement of the left ventricle by the enlarged right ventricle lifting the ventricular apex above the diaphragm. The heart may be boot shaped.

(2) Concave pulmonary artery segment in addition to decreased pulmonary vasculature due to pulmonary stenosis.

(3) In about 25% of these cases there is a right sided aorta.

Angiocardiographic signs.—Early radiographs after injection of the dye may reveal an enlarged right ventricle and a staining of the left ventricle due to the presence of ventricular septal defect. Also a discreet zone of the stenosis of the infundibulam may be seem in infundibular stenosis. A little later radiographs will show a simultaneous opacification of the pulmonary artery and aorta proving the existence of over riding aorta.

Case I—Fallot's Tetralogy.—Slide 9, Rajalakshmi, age 8, female partient. Cyanotic from birth. Systolic murmur in pulmonary area. E.C.G. Rt. axis deviation.

Plain x-ray findings.—PA segment concave diminished pulmonary vasculature - Right sided aorta - Right ventricle enlarged.

Case II—Fallot's Tetralogy No. 10.—Rajendran - Age 3 - male child cyanotic from birth.

Plain x-ray findings decreased pulmonary vessels - concavity at the pulmonary conus Rt. sided aorta.

Case III.—34 to 37 slides (Pradeep Kumar).

Angiocardiographic findings.

Simultaneous opacification of the pulmonary artery and aorta—Infandibular stenosis.

Case IV.—Slides Angiocardiographic findings.

Simultaneous opacification of pulmonary artery and aorta - valvular stenosis.

Triscuspid atresia is the next lesion in this group in the order of frequency.

Plain x-ray findings

Right atrium is markedly enlarged causing an enlargement of the heart towards the left and the right ventricle is small. Most often this lesion is associated with atrial septal defect.

Flattening of the right border of the heart described by Tausig may not always be appreciable. Right to left shunt may result in the enlargement of right auricle, left auricle and left ventricle.

Angiocardiographic findings.—Simultaneous opacification of the right atrium left atrium and left ventricle from the right atrium may be seen in early films. The notch like filling defect in the diaphragmatic surface of the heart near the mid line represents the area of non opacified rudimentary right ventricle.

Case I, Tricuspid.— Atresia Govindaraj. Slide 11 and 11 A. Plain x-ray findings - Diminished pulmonary vasculature—Enlarged right auricle - Right ventricle is small. Angiocardiographic findings.

Case II.—Tricuspid atresia.

Slide 12.—RA enlarged RV flat.

Angiocardiographic findings.—Simultaneous opcification of RA, LA, LV notch like filling defect at midline of diahragmatic surface due to small unfilled RV. Another less common lesion in this group is the Triology of Fallot which consists of atrial septal defect and pulmonary stenosis usually valvular with a right to left shunt at the atrial level.

Plain x-ray findings.—Cardiomegaly is marked, pulmonary artery segment is not concave but mildly convex. There may be left atrial enlargement. Aorta is not strikingly enlarged and right aortic arch is rare. It is impossible to distinguish this lesion from tetralogy from conventional films. Angiocardiography will show the shunt at the atrial level.

Summary

"All that is usually necessary in order to arrive at a clinical diagnosis is to correlate the history, physical, fluoroscopic, roentgenologic and electrocardiographic findings" (Gasul).

Thus the roentgenologic evaluation of the congenital cardiac anomalies is the most important tool available for the diagnosis of these lesions.

A careful analysis of the Roentgen findings in plain radiographs along with fluoroscopy gives a very great aid in the diagnosis of congenital cardiac lesions. Only in doubtful and difficult cases need advanced specialist investigations as angiocardiography, retrograde aortography and cardiac catheterisation need be resorted to. In such cases the above investigations are absolutely essential and most often decisive. In this method of examination of plain radiographs, division of patients into various groups depending upon the appearance of pulmonary vasculature is most rewarding. This method of analysis has been brought to the forefront by Drs. Leo G. Rigler, Richard Lester and their associates from the Minnesota School of Radiology whose findings I have made use of. Precise diagnosis of congenital cardiac anomalies has become very necessary since many of these lesions can be surgically corrected or ameliorated. Radiological investigations and evaluation in conjunction with clinical data will provide the most valuable working diagnosis of congenital cardiac anomalies.

I am thankful to Dr. Balasubramaniam, M.S., Dean of the Government Stanley Medical College and Hospital for allowing me to make use of the cases of the Stanley Hospital in preparing this paper as well as for his encouragement and the Staff of the Radiology department, Stanley Hospital for all the help willingly given.

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X-Radiation in Chronic Myeloid Leukaemia

BY

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The efficacy of X-rays in the treatment of certain forms of leukaemia and allied diseases was demonstrated early in this century (Pusey, 1903) and for nearly fifty years radiation therapy provided the chief armament for the control of chronic myeloid leukaemia (C.M.L.) and lymphatic leukaemias. This is of no value in acute leukaemias. This form of therapy is very commonly used in C.M.L. and remissions are often complete but relapses invariably occur (Chatterjea, 1958). X-rays do not as a rule prolong life but invalidism is minimal as the quality of life is improved (Witts and Levit, 1936). This treatment has apparently been employed in the treatment of C.M.L. in India for many years but the literature relating to the results obtained is very scanty. In this institution Napier et al (1937) reported good results in four out of six cases treated by them with deep X-ray therapy.

Material and method

During the last few years 12 cases out of a total of 116 cases of C.M.L. were treated with X-rays alone. Of these 12 cases detailed radiation history as regards dose etc. was available in 10 cases. All had splenomegaly and moderate degree of anaemia. Ages of the patients varied from 1 to 60 years. Eight were males and two females. The duration of the illness as given by the patients was less than one year in seven cases, between 1-2 years in two and 5 years in one.

X-ray treatment was given after the confirmation of diagnosis of C.M.L. by complete haematological investigation. Routine blood counts were done during and after each course of radio-therapy. The usual procedure was to have a blood count after each 300r. Radiation was applied to the spleen in all ten cases by three portals-anterior, posterior and lateral and to the thigh in addition in case No. 5. The source of emanation of radiation was, 140 kvp, 5 ma, 1 mm al + $\frac{1}{4}$ mm cu, 25 cm distance and at a rate of 100r per portal for 3 days consecutively. Of these ten cases 5 had 900r, one each 1,200, 1,500, 1,800, 2,500 and 3,000r. Case No. 5 had 900r to the spleen and 2,100r to the thigh where there was leukaemic infiltration. The thigh was irradiated by three portals similar for the spleen.

Observations

The total dose of radiation and the blood count specially the W.B.C. count before during and after radiation are enumerated in the annexed table. By 900r, the W.B.C. came down below 10,000 in three cases and between 10,000 to 15,000 in the other two. One with 1,200r recorded a W.B.C. count of 6,700 after two months and one with 3,000r W.B.C. came down below 10,000 in the course of seven months during the same period another case with 2,500r W.B.C. recorded a fall to 15,000 from 3,187,000.

Discussion

The number of cases as reported in this paper is admittedly small because since the introduction of chemotherapeutic agents it

Name	Blood count before irradiation	X-radiation	Blood count	X-radiation	Blood count	Total X-radiation in r	Blood count	Remarks
P.R.	27–8–53 Hb. 7·83 R.B.C. 3·04 W.B.C. 3210	300 r	14–9–53 Hb. 6·96 R.B.C. 2·76 W.B.C. 117·0	300 r	21–9–53 W.B.C. 53·0	300 r	19–10–53 W.B.C. 9·1	Relapse after 1 year
Kn.	31–7–58 Hb. 8·41 W.B.C. 168·5 R.B.C. 2·18	300 r	14–8–58 Hb. 7·83 W.B.C. 101·6	300 r	25–8–58 Hb. 7·25 W.B.C. 78·5	300 r	8–9–58 Hb. 8·9 W.B.C. 9·6	Lost for further study
A.C.	21–5–58 Hb. 6·09 R.B.C. 2·4 W.B.C. 250·0	300 r	7–6–58 Hb. 5·8 R.B.C. 1·82 W.B.C. 115·5	300 r	14–6–58 Hb. 6·67 W.B.C. 51·5	300 r	19–6–58 Hb. 7·25 R.B.C. 3·21 W.B.C. 13·2	Relapse after 2 years
J.N.D.	26–10–59 Hb. 9 57 W.B.C. 195·5	300 r	5–11–59 W.B.C. 126·0	300 r	9–11–59 W.B.C. 94·0	300 r	16–11–59 Hb. 9·28 W.B.C. 42·0	Being followed up
N.N.B.	31–3–59 Hb. 5·8 R.B.C. 2·02 W.B.C. 297·5	600 r	17–4–59 Hb. 8·99 W.B.C. 113·0	300 r	24–4–59 Hb. 9·28 W.B.C. 97·0	300 r	30–4–59 Hb. 10·44 W.B.C. 74·0	Do
Ln.	16–3–59 Hb. 9 86 R.B.C. 2·9 W.B.C. 70·6	300 r	26–3–59 Hb. 9·28 W.B.C. 66·0	300 r	2–4–59 Hb. 9·57 W.B.C. 27·0	300 r	23–4–59 Hb. 10·15 R.B.C. 3·15 W.B.C. 8·7	Relapse after 18 months
R.K.	2–6–58 Hb. 4·6 R.B.C. 1·56 W.B.C. 180·0	300 r	18–6–58 Hb. 7·8 R.B.C. 2·25 W.B.C. 43·20	300 r	25–6–58 Hb. 7·25 W.B.C. 33·6	300 r	2–7–58 Hb. 8·7 W.B.C. 37·0	Relapse after 9 months
G.S.	25–4–60 Hb. 6·96 R.B.C. 2·8 W.B.C. 242·0	300 r	2–5–60 Hb. 8·41 W.B.C. 100·0	600 r	27–5–60 Hb. 13·05 W.B.C. 5·8	600 r	27–6–60 Hb. 13·3 W.B.C. 34·0	Relapse after 2 months
M.D.	23–4–60 W.B.C. 290·0	600 r	10–5–60 Hb. 10·15 W.B.C. 196·0	300 r	4–6–60 Hb. 8·7 W.B.C. 20·8	—	13–6–60 W.B.C. 12·5	Being followed up
R.C.B.	21–2–59 Hb. 9·62 R.B.C. 3·09 W.B.C. 318·7	300 r	7–3–59 Hb. 8·80 R B.C. 3·16 W.B.C. 280·2	1100 r	2–5–59 Hb. 8·39 R.B.C. 2·80 W.B.C. 172·5	1100 r	14–6–59 Hb. 10·72 R.B.C. 3·4 W.B.C. 119·5	Relapse after 7 months

*Done in another institution.

is difficult to get cases treated with radiation alone and the effect of radiation alone cannot, therefore, be properly assessed in most of the cases. X-radiation to the spleen or skeleton is a powerful therapeutic agent in C.M.L. Radiation of the spleen is more favoured because of the quicker improvement in the Hb and R.B.C. values than in skeletal radiation (Witt and Levit, 1936). Splenic radiation, however, needs better precision of technic and dosage. Whole body irradiation is dangerous and has no added advantage over splenic radiation.

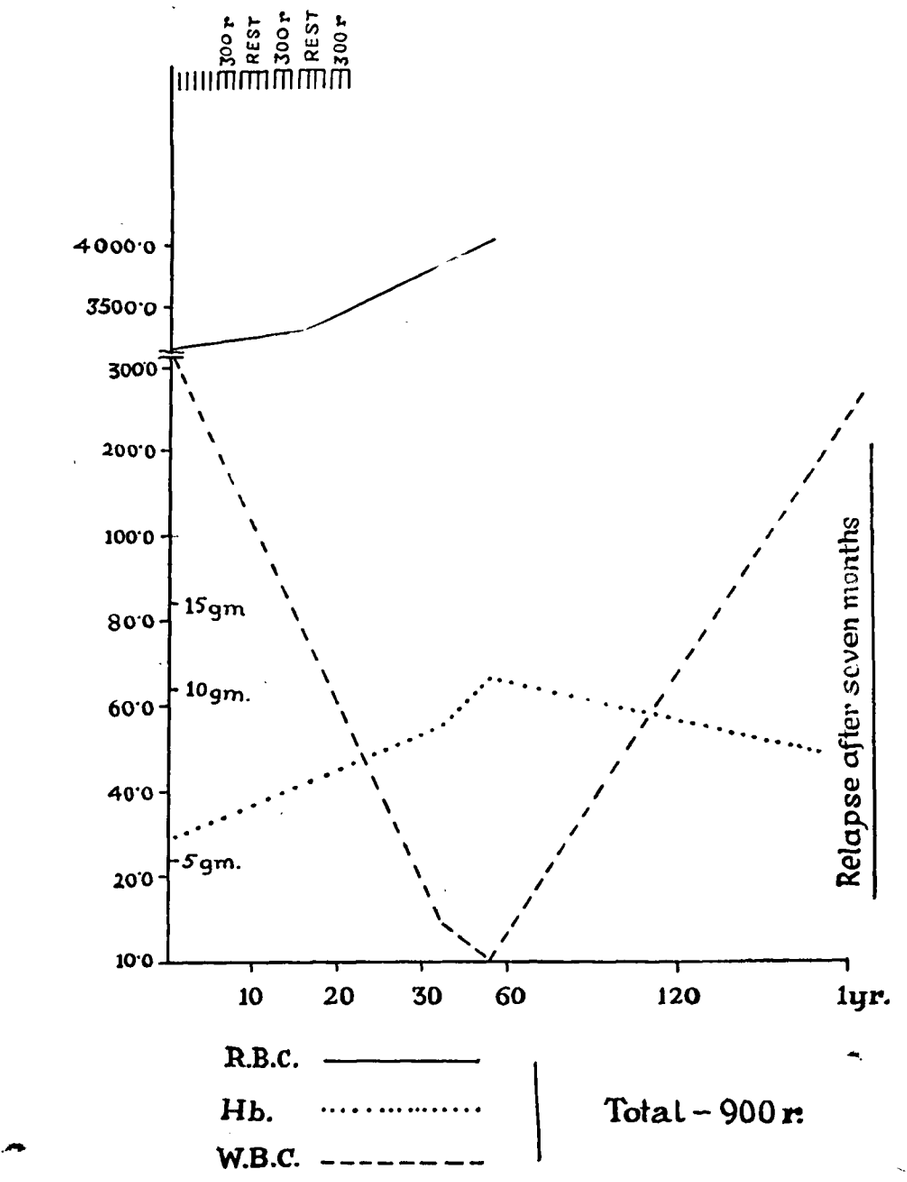
Different workers have put forward different views as regards the dosage and continuation of therapy in relation to the total W.B.C. count. Witts and Levit (1936) have recommended 15,000 W.B.C. count as the guide for discontinuation of therapy. Napier et al (1937) held more optimistic view and suggested that continuance of therapy after the W.B.C. count has touched normal could probably prolong the remission period and ultimately lead to a cure. Ralston Paterson (1947) recommended 7,000 as the level where the maximum period of remission can be obtained. Chatterjea (1958) recommended discontinuance of X-ray therapy when the W.B.C. count sharply fell to 30,000 or so and further applications in case of relapse until the case gets radio-resistant when other forms of therapy may be taken advantage of. From the series presented, the author is of opinion that therapy may be discontinued when the W.B.C. count comes down to 10,000 or near about, after about 1,000r and is in agreement with Chatterjea for further application of 2nd, 3rd, 4th course or more of 300r each until therapy fails because of radio-resistance. There are of course some individual variations.

As regards the period of remission three cases with 900r relapsed within a period of two years, minimum being one year. One with 1,800r showed relapse within two months and the other two with 1,500 and 2,500r within nine and seven months respectively. Case No. 5 with 900r to spleen and 2,100r to skeleton showed a tendency of rise in W.B.C. count after about 18 months. From the above, it appears that the swing to the normal blood count is not always dependent on the amount of radiation, nor the period of remission and the subsequent relapses on the same factor. The value of the second dose of therapy on relapse may be observed in case Nos. 7 and 8. In case of No. 7 there was relapse after nine months after an application of 1,200r and a dose of further 300r brought a decline in the total W.B.C. count. Case No. 8 showed a remission after 900r within a month and the W.B.C. count recorded 5,800 but relapse ensued within a month and another dose of 900r spread out over two months could bring another remission.

By judicious therapy the W.B.C. count comes down and the Hb goes up (Fig. 1). It is often very difficult to asses the haemopoietic response of repeated doses of radiation and after a variable time radio-resistance develops and this mode of treatment may have no effect on the leukaemic state. Ralston Paterson (1947) considers this as a signal for marrow aplasia.

Ghose and Chatterjea (1958) described some side effects of radiation such as nausea, vomiting, anorexia, diarrhoea, weakness and giddiness. These are probably due to radiation sickness and can be relieved by increasing the interval between the courses of radiation. Any reduction of dose above the therapeutic level may not bring any relief of the symptoms. Previous workers have recommended liver extract by injection, fluids and glucose and excess carbohydrate diet. Chatterjea (1958) got good results by gastric sedatives. Another serious

Fig – 1



complication that may arise during the radiation therapy is 'blast crisis'. Chatterjea and Ghose (1958) and Napier et al (1937) had one such case each in their series during therapy.

Mode of action of X-rays

The nature of action of X-rays is still an enigma and the treatment is mostly empirical (Witts and Levit, 1936). Extensive observations on the radiation effects have shown that living tissues are affected in the following order according to their degree of sensitivity: lymphoid cells, other haemopoietic cells, including erythroblasts and megakaryocytes, epithelial cells, endothelial cells. Thus the blood forming cells are the most radio-sensitive of all living cells. Primitive erythroblasts and megakaryocytes are equally sensitive to irradiation. The rapid fall in the peripheral leucocyte count found often after local exposure in therapeutic dosages is due to the following factors: (a) damage to the leucocytes while circulating through the part irradiated, (b) production of a toxic substance elsewhere and (c) emigration of leucocytes from the peripheral circulation. Leucotoxic action could be proved as yet. There is, however, experimental support in favour of a hormonal factor in the form of pituitary - adreno - cortical - stress mechanism (Selye, 1946).

In short the chief mechanism of radiation effect in leukaemia is a direct one upon the proliferating leucocytes involving interruption of mitosis. The effect leads to decreased production of leukaemic cells and allows normal haemopoiesis to become re-established (Hayhoe, 1960).

Summary

The literature on radiation treatment of leukaemia in India and abroad has been briefly reviewed. Results of radiation therapy as studied in ten cases of chronic myeloid leukaemia indicate.

1. X-radiation produces a temporary remission in chronic myeloid leukaemia.

2. After a few courses of radiation treatment radio-resistance develops.

3. The phenomenon of initial success and the late failure is ill understood.

4. The effect on the haemopoietic system and the period of remission are not always dependent on the amount of radiation.

I express my thanks to Dr. J. B. Chatterjea, M.D., Prof. of Haematology, School of Tropical Medicine, Calcutta, for giving me all facilities to study the records of cases under him.

REFERENCES

1. Pusey, W. A.: J. Amer. Med. Ass., **28**, 166, 1903.
2. Witts, L. J. and Levit, L.M.: B.M.J., **1**, 762, 1936.
3. L. Everard Napier, Sen Gupta, P.C. and Chaudhuri, R. N.: I.M.G., **72**, 329, 1937.
4. Selye, R.: J. Chin. Endocrinology, **6**, 117, 1946.
5. Ralston Paterson: Treatment of Malignant Disease by Radiation and X-rays, 438-453, Edward Arnold & Co., London, 1947.
6. Chatterjea, J. B.: J. I. M. A., **30**, 314, 1958.
7. Ghose, S. and Chatterjea, J. B.: Ibid, **34**, 381, 1960.
8. Hayhoe, F. G. J.: Leukaemia - Research and Clinical Practice, p. 150, J. & A. Churchill Ltd., London, 1960.

Tuberculous Pericardial Effusion

BY

Dr. L. R. PARTHASARATHY, M.B., B.S., D.M.R.,

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A patient by name S. A. Parthasarathy, aged 45 years reported to the Southern Railway Hospital, Perambur, on 5-8-1960 with a history of irregular fever with chill and sweating from 24-7-1960. Cough without expectoration - 3 days duration, feeling of food getting stuck up behind the sternum of 1 week duration.

Previous History.—No history of pulmonary tuberculosis. Had an attack of Malaria for 20 days, seven years ago. Otherwise Nil particular.

General Condition.—Fairly nourished, No dyspnoea, neck veins prominent, blood pressure - 130/90, Pulse 110 per minute, Volume and Tension - Fair - Temperature 101°. The praecordium showed some diffused bulging, apex beat was not visible. The apex beat was felt in the 5th intercostal space just internal to the mid clavicular line. There was no tracheal shift. Percussion revealed that the area of cardiac dullness was much increased on both sides. The right border of the heart was about two fingers beyond the right border of the sternum. The left border went up to the left anterior axillary line in the fifth intercostal space. The heart sounds were audible in all areas but only feebly. There was no gallop rhythm or murmurs or rub heard over the precordial area.

Respiratory system diminished air entry and slightly impaired resonance over the left base. Abdomen : Spleen palpable about 3 fingers.

The following investigations were done :

Blood - Hb. 75%, TRBC 3·82 millions, TWRC 7,400/c.m.m. DC Poly 58%, Eosino 5%, Lympho 37%, Urine - Routine & Mic. Albumin - trace. Sugar - nil, Mic. Exam. 2 to 3 pus cells present. Night blood for MFB - Negative. Motion - Nil abnormal. Sputum for AFB - Negative. Resting juice for AFB - Negative. Blood ESR - 1 hour/ 26 mm. Blood VDRL - Negative. Random blood sugar - 195 mgs. %. Smear for MP - Negative.

X-ray and Fluoroscopy Findings.—X-ray showed increased transverse diameter of the cardiac silhoutte. All the normal cardiac contours were obliterated. The shape of the heart resembled to a flask.

On Fluoroscopy the heart was globular in shape in recumbent position. There was lack of differentiation between left auricle and left ventricle with marked diminution of visible pulsation of heart noted. There was change of configuration from globular to pear shape with patient in upright position. There was shortening and widening of vascular supra cardiac shadows. (See Fig. 1).

E.C.G. Finding.—There was low voltage in all the leads. There was no changes in T wave and ST segment. The patient was put on Anti-tubercular treatment. Streptomycin 1 gram daily and I.N.H. 300 mg. daily with Delta-Cortil 20 mg. daily in addition to Vitamin C. The temperature came to normal on the 5th day and

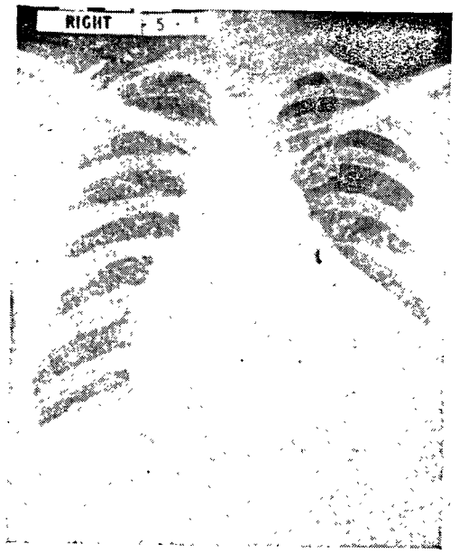

Fig. 1
Condition on Admission.

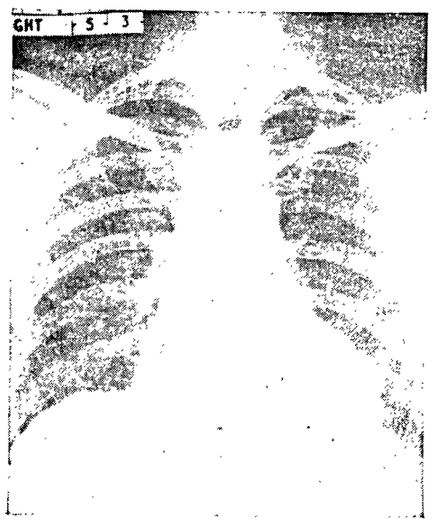

Fig. 2
2 weeks after treatment.

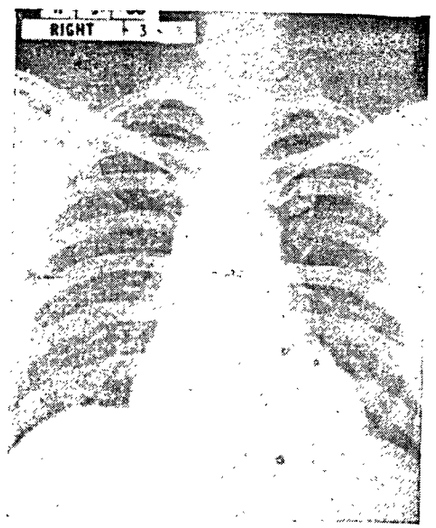

Fig. 3
One week before discharge.

remained normal throughout the course. The patient's clinical condition greatly improved and the patient was discharged on 19-9-1960 with advice to continue the Anti-Tubercular Treatment.

Pictures taken on 17-8-1960 (Fig. 2) and 8-9-1960 (Fig. 3) show radiological improvement.

Case II

Patient A. Raghavalu, aged 33 years, Sweeper by profession, was admitted at the Southern Railway Hospital, Perambur, on 22nd March 1960 with a complaint of breathlessness 6 days duration, cough with expectoration 7 days duration.

Previous History.—He was treated at Ranipet 8 years ago for suspected Tubercular Cervical Adenitis. No history of Pulmonary Tuberculosis.

Family History.—Wife had Pleurisy with effusion left, last year and was treated as an in-patient in the same hospital.

General condition of the patient.—Fairly nourished, not anaemic, not jaundiced, Temp: 101°, Pulse 114, Blood pressure 110/88, pulsating veins present over the neck.

Cardio Vascular system.—Tachycardia was present; Volume and Tension of Pulse - Good; The heart sounds were audible in all areas but only feebly.

Respiratory System.—Cavernous breathing left mid zone and base with rales right base.

The following are the results of the investigations done:

Blood - Hb 70%, TRBC 3·54 mgm. TWBC 8,800/Cm. DC P - 62%, E - 4%, L - 34%, MP No MP found. Urine: Routine and Mic. Exam. Alb. Nil. Sugar Nil. Mic. Exam. - Nil abnormal. Sputum for AFB - Negative. Resting juice for AFB - Negative. Night blood for MFB - Negative. Motion - Nil abnormal. ESR 28 mm/1 hour. Blood VDRL - Negative.

X-ray showed marked enlargement of the transverse diameter of the heart with obliteration of the left costophrenic angle. Fluoroscopy confirmed as massive pericardial effusion with left sided plural effusion and as the condition of the patient was not satisfactory, paracentesis of the pericardium was done on 23-3-60 and 800 cc. of blood stained fluid aspirated from the pericardium which was sent for smear and culture. The patient was put on Anti-tubercular treatment, Streptomycin and I.N.H. in addition to Delta-Cortil. The temperature touched normal on the third day and remained throughout normal.

E.C.G. taken on 30-3-60 showed evidence of low voltage with inversion of T waves in leads III, AVF, V-1, V-2 and V-3.

Aspirated fluid - Proteins 4·2 Gms. %.

Smear - No AFB - No organism.

Fig. 1 shows the first picture of the patient. Fig. 2 shows after aspiration. Fig. 3 and 4 after the Anti-Tubercular treatment. Obvious radiological improvement seen.

Comments

Tuberculosis of Pericardium is not so rare as is generally supposed. It can happen as a primary condition of the pericardium as the above two cases, eventhough Tubercular affection of the Pericardium is usually secondary to a primary focus. In

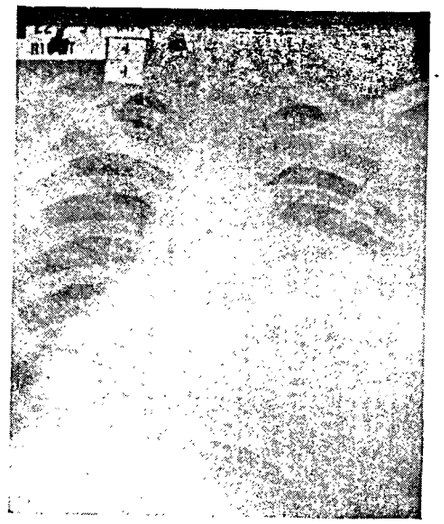

Fig. 1
Condition on Admission.

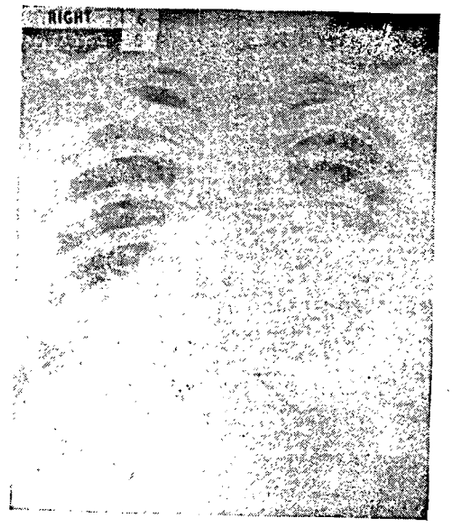

Fig. 2
Condition after Paracentesis.

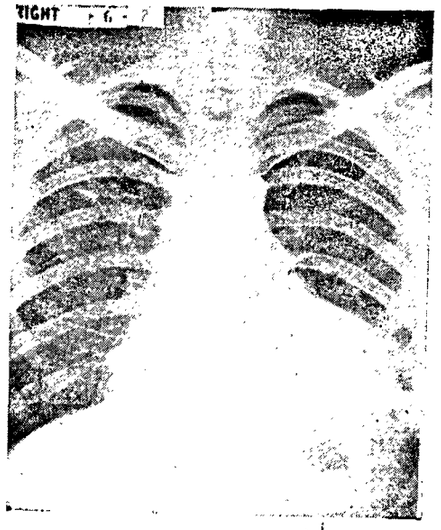

Fig. 3
After 2 weeks treatment.

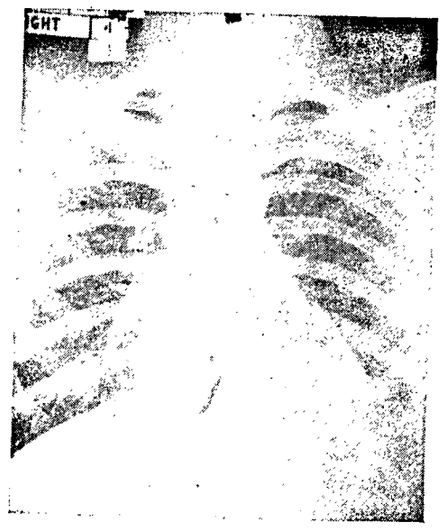

Fig. 4
After 1 month treatment.

our country where there is high incidence of Tuberculosis in all forms, Tubercular Pericarditis must be borne in mind. Pericardial effusions of tuberculous origin are generally painless. The advent of Roentgenology in the diagnosis of diseases especially of the Thoracic Viscera has led to the recognition of pericardial disease much more frequently than in the past. Fluoroscopy confirms the diagnosis. Kymography also helps in diagnosis. For the relief of Dyspnoea, paracentesis of pericardial effusion is usually done.

Demonstration of tubercle bacilli in the aspirated fluid by smear, culture or animal inoculation is conclusive of the diagnosis but it is often not possible.

(My thanks are due to Dr. N. Govindarajalu, M.S., Divisional Medical Officer, for permission to publish this article. My thanks are also due to Dr. K. S. Sanjeevi, M.D., Consultant Physician, Southern Railway Hospital, Perambur, who gave me valuable guidance. I am thankful also to Dr. C. Gopalakrishnan, M.B., B.S., who was in charge of the case).

REFERENCES

1. Text Book of X-ray Diagnosis by Cochrane Shanks.

Abstracts of Radiological Literature

J. W. Laws and J. G. C. Fox, Factors controlling the rate of injection of contrast media in angiocardiography, Br. Jour. Radiology, February 1960, Vol. 33, 119-123.

The effects of various factors on the rate of injection in angiocardiography were studied. Rapid injection is essential if good results are to be obtained. A Talley pressure injector was used.

Out of the 3 media, (1) sodium acetrizoate 70 per cent (2) Urografin (3) sodium diatrizoate 85 per cent, there was little difference in the rate of flow of the 3 media for practical purposes, and all subsequent experiments were carried out with sodium diatrizoate.

Regarding the effect of temperature on the contrast media, it was found that no difference was detectable in the range 100°-120° F., the rate being 37 ml. per second throughout, but at lower temperatures, *e.g.* 60° F, the flow rate was appreciably diminished.

It is important for angiocardiographic purposes, that the largest catheter practicable be used, the limiting factors were the calibre of the patient's veins and the external diameter of the catheter. Results showed that under comparable conditions, the flow of contrast medium through a No. 10. N. I. H. catheter was slightly more rapid than through the No. 10. Porges catheter, and considerably more rapid than through a No. 10 Cournand catheter. Because of the superior flow rate obtainable with N. I. H. catheters, these were used for subsequent purposes.

The rate of flow of contrast medium through a No. 10. N. I. H. catheter was more than twice as fast as through a No. 8, and more than 3 times as fast as through a No. 7.

Since the cross-section area of the 25, 50 and 100 ml. syringes is in proportion to their volume, *i.e.* 1 : 2 : 4, it was found that twice the pressure was required with the 50 ml. syringe as with the 25 ml. syringe, and 4 times the pressure with the 100 ml. syringe. This was true for the 100 and 50 ml. syringes, but not for the 25 ml. syringe. This apparent anomaly was due to the very short duration of the injection.

It is therefore concluded that the type and size of the cardiac catheter are by far the most important factors in obtaining a rapid flow. The choice of medium may depend on lack of toxicity. Pressures between 100 to 130 lb. per sq. inch were suitable for injection and the Talley pressure injector was both satisfactory and cheap.

S. N. Deboo, Bombay.

S. Brunner and O. Ch. Pock-Steen, Localised emphysema, Acta Radiologica, March 1960, Vol. 53, 184-190.

There are various subgroups of localised emphysema, one of which is bulla and the other is bleb. Bullae are frequently multiple to make up a major or minor localised emphysema, appearance resembles a bunch of grapes. In extreme cases an entire lobe may be involved, when the condition is called lobar emphysema. It seems reasonable therefore to consider all cases of bullae, blebs and localised emphysema as one clinical entity.

The pathogenesis is now considered to be a check-valve mechanism in an afferent bronchial branch. A valve may be formed by mucosal hypertrophy, allowing the air to pass into the alveoli but not to escape again. Mucosal hypertrophy is not always present in cases of localised emphysema, the valve mechanism then appears to be due to deficient development or possibly the total absence of cartilaginous rings in the bronchial branch. Localised emphysema may coexist with bronchogenic tumours, when it is a sign of partial occlusion of a bronchus.

Clinically, many cases are asymptomatic until secondary infection occurs in the involved area, so that it is not uncommonly a chance finding in routine investigations. The most important sign is dyspnoea, usually only on exertion. Cough, expectoration and chest pain are not uncommon. At times rupture of a peripheral alveolus may give rise to spontaneous pneumothorax.

Roentgenologically, the localised emphysema is characterised by an area more translucent than the remainder of the lung. There is as a rule no distinct demarcation between the adjacent healthy parenchyma. Isolated bleb are extremely difficult to diagnose in an intact lung. If pneumothorax is present, small annular structures may be seen on the surface of the lung. Multiple bullae generally form a honey-comb structure in the affected area. They may often be difficult to differentiate from bronchiectases or pulmonary cysts, and the final diagnoses can be made after operation and microscopic examination of the diseased tissue. Fluoroscopy will show less effective emptying of the involved lobe. If there is a suggestion of emphysema, it is advisable to obtain films in inspiration and expiration.

4 radiographs.

S. N. Deboo, Bombay.

W. T. Bessler and R. R. Renner. Selective Bronchography, Am. Jour. of Roentgenology, February 1960, Vol. 83, 297-301.

In cases of failure to visualise a particular area of interest or where a well defined diseased segment or lobe is to be investigated, selective bronchography of that lung is the method of choice.

A technique for selective bronchography is described here. After anaesthesia of the posterior pharynx, epiglottis and glottis, a metras catheter is then passed into the trachea. The patient is then placed into the posterior oblique position on the side to be studied, and under fluoroscopy control, the tip of the catheter is then placed in the orifice of each of the major bronchi on the side to be examined. The catheter is then placed in the upper lobe bronchus or one of the segmental bronchi, and with the patient in a slightly head down position, propyliodone is injected. The degree of filling is controlled by fluoroscopy.

Spot radiographs are made whenever adequate filling of the lobe or segment is seen. Ideal filling is obtained, when peripheral bronchi are demonstrated, without evidence of alveolar filling. Care should be taken to see that the contrast medium does not pass into the other lung.

The upper lobe is usually filled first, followed by the middle lobe or lingula. For injection into the lower lobe, the patient is tilted to a semi-erect position. Anteroposterior, oblique and lateral radiographs are taken in recumbent and sometimes in upright positions.

For visualising cysts, bronchiectatic cavities, or some bronchial filling defects, coughing is allowed after the tree is filled this manoevure will cause the contrast medium to flow further peripherally and provide relief for visualisation of the bronchial outlines.

Image intensification method is desirable, in order to diminish the fluoroscopic dose of radiation.

S. N. Deboo, Bombay.

E. Samuel, The use of contrast media in the investigation of the acute abdomen, Br. Jour. Radiology, February 1960, Vol. 33, 82-91, (Paper read at the 9th International Congress of Radiology, Munich, 1959).

In intestinal conditions, a preparation made from Urograffin 76 per cent, Saccharin, tween and orange flavouring identical with Gastrograffin was used, for investigation. Technique employed was the no-touch technique, with the patient in supine position, and by using gravity and posture to keep the medium from diffusing, a relatively good mucosal relief was obtained. With this method, it was possible to detect hiatus hernia, oesophageal changes, duodenal ulcers and diverticulae etc., but gastric ulcers were more difficult and reliance must be placed on the front view rather than demonstration of the ulcer niche in profile. The trefoil deformities and marked spastic changes seen in a chronic ulcer were not as frequently demonstrated in the acute stage. Blood clot in some cases produced a filling defect, but the appearances were more like those produced by a bezoar, and in a case of gastrointestinal bleeding this appearance is diagnostic of a blood clot. In a large number of cases suspected of leaking duodenal ulcers, penetrating ulcers were noted.

In pancreatic lesions, the commonest finding in acute pancreatitis has been a distended loop of jejunum, but this was not sufficiently definite to allow a confident diagnosis to be made. Pseudo-cysts and tumefactions of pancreas can be detected at a relatively early age by means of Gastrograffin.

In gallbladder lesions, if after injection of 20 c.c. of Biligraffin forte, a failure of visualisation of the gallbladder or the extrahepatic ducts is found, it is to be concluded that the liver has failed to concentrate the medium sufficiently to enable a shadow to be seen. If the liver excretes the medium, the gallbladder and the ducts are normally filled. If the extrahepatic ducts fill normally, but the gallbladder fails to visualise normally, obstruction of cystic duct is indicated.

In urinary tract lithiases, a stone lodged in the ureter causes suppression of excretion of contrast medium from that kidney, and although a dense nephrogram is obtained, the demonstration of stone is disappointing. The features indicating presence of a non-opaque stone are a delay in the appearance of the pyelogram on the affected side, a prolonged nephrogram on the affected side, and distension of the pelvis and ureter as far as the site of obstruction.

S. N. Deboo, Bombay.

C. Z. Berman and N. L. Avnet, The use of water-soluble urographic contrast media in paedriatic gastrointestinal studies, Br. Jour. Radiology, February 1960, Vol. 33, 92-97.

The authors used water-soluble contrast media in upper gastrointestinal examination of infants and children. The dose was 30-60 c.c. (depending on age) of 35 per cent solution of sodium diatrizoate, and later on Gastrograffin was used.

In infants and children, in the absence of the ileus, a radiograph made one hour after

ingestion, almost uniformly showed the medium distributed throughout the small and large intestines, and delay in transit, except in premature babies, appeared to indicate ileus, either obstructive or para lytic. In a series of ten patients (otherwise normal premature infants) passage of the contrast medium was slower, so that in premature infants, apparent retention of medium in the small bowel must be interpreted with caution and is not necessarily abnormal.

In the diagnosis of hypertrophic pyloric stenosis, the material, because of low viscosity rapidly diffuses into the pyloric canal, demonstrating the abnormality. When however clinical picture suggests an abnormality involving localised mucosal distortion or irregularity, as in duodenal or gastric ulcer, or oesophageal varices, barium suspension is preferred. In examination of the oesophagus, barium provides a more persistent outline of the contours of the organ.

During the passage of the medium in the small intestines, its progressive dilution is a distinct disadvantage in demonstrating a mid-or low small bowel abnormality.

After oral administration, there is a relatively high incidence of urinary tract opacification, but there was no correlation between this and the presence of intestinal obstruction.

An occasional mild cathartic effect with oral administration of these preparations has been observed. The incidence of serious reaction to iodine - containing contrast media in this age - group is extremely small, but atleast, one death has been reported. On the basis of these experiences, the authors do not recommend the routine use of such compounds in gastrointestinal study in infants, but it appears justified for special problems such as intestinal ileus, and for infants who are vomiting and show a significant risk of aspiration.

S. N. Deboo, Bombay.

Hillier L. Baker and John R. Hodgson, Further studies on accuracy of Ora Cholecystography, Radiology, February 1960, Vol. 74, 239-245.

In a series of 1207, cholecystographic examinations in which all diagnoses were subjected to surgical and pathological verification, 1·9 per cent of all diagnoses were found to be in error.

The use of Iopanoic acid did not materially influence the percentage of gallbladders that exhibited some degree of function, but it did increase the number of gallbladders observed with higher concentrations of medium. There was no evidence that this increased opacity of Iopanoic acid obscured tiny calculi or rendered normally visible abnormal gallbladders which did not contain stones.

The diagnosis of normally functioning gallbladder was found to be correct in 98·3 per cent of such cases. All gallbladders called "poorly functioning" were found to be diseased. The diagnoses of such "poorly functioning" was made 22 times, and in 2 of these 22 patients the gallbladder was found to be normal, a diagnostic error of 10 per cent. Two per cent of all so called non-functioning gallbladders were found to be normal. Stones were found in 98·0 per cent of the cases diagnosed preoperatively as cholelithiases. Polyps, papillomas, or adenomas were found in all cases in which they are reported.

The authors describe their technic. 3 useful technical adjuncts are given: (1) A new drug, dihydrooxyphenylisatin, a purgative, has been used as an enema. Side effects such as cramping and faintness are usually mild, but may be severe, so that the drug is not to be used if the patient is elderly or debilitated. (2) different types of plastic foam blocks may be placed under the gallbladder, will afford some compression of this region, displacing galls-filled loops of bowel or permitting a reduction in the exposure time in very obese patients. (3) a purified form of the hormone, cholcystokinin, which causes the gallbladder to contract by direct action on the muscular walls, has been used as a possible substitute for the Boyden meal. Because it must be administered intravenously, it is not applicable to large groups of patients. This permits the performance of gastrointestinal studies on the same day as cholecystography without foregoing the so called postcontraction film.

S. N. Deboo, Bombay.

Osborn Bartley and Ingmar Wickbom, Roentgenologic diagnosis of rupture of the diaphragm, Acta Radiologica, Vol. 53, Jan. 1960, 33-41.

Rupture of the diaphragm is a serious and not uncommon condition. Nine cases of rupture of diaphragm are reported here. It is generally amenable to surgical treatment if discovered in time.

Most diaphragmatic ruptures are the results of street accidents, usually the result of non-penetrating injuries of the abdomen, frequently a crush injury. It may also occur following direct trauma associated with fractured ribs or after a penetrating wound. It is frequently a concomitant of multiple injuries in other parts of the body, such as fractures of the pelvis and limbs and ruptures of the spleen or other abdominal organs. Since these injuries are more conspicuous, a rupture of diaphragm may be easily overlooked.

The signs are due to herniation of the abdominal organs into the thorax. Since in 95 per cent of cases the rupture is situated on the left side, it is usually the stomach, the splenic flexure, and the spleen which are forced into the thorax. The signs arise by pressure by these organs on the lungs and mediastinum, or from compression of the herniated organs by the ruptured diaphragm. Compression of abdominal organs in the rupture gives rise to digestive tract symptoms, in the form of vomiting and retrosternal pain, where as the thoracic symptoms resemble shock with dyspnoea and circulatory collapse. These sequelae may appear immediately, but sometimes they are delayed. The diagnosis is best established by roentgen examination of the chest which will reveal parts of the stomach or colon into the thorax.

The difficulty arises in diagnosis when the herniated distended part of the stomach or colon is shaped like a cupola and may thus be mistaken for paralysis or relaxatio diaphragmatica, or when the herniated abdominal organs are concealed by fluid in the pleura. If the rupture is sufficiently wide, the herniated organ may become partially or completely reduced when the patient is in an upright position. If with the patient recumbent, the lateral part of the formation constitutes the highest point, it will be pathognomnic of a lateral rupture. In doubtful cases supplementary examination, the most reliable one, is the pneumoperitoneum, with this procedure, the diaphragm itself can be localised, and if a pneumothorax is also demonstrable, the diagnosis will be established. The authors have no personal experience of this method.

S. N. Deboo, Bombay.

Bela. Gondos, Rotation of the kidney around its transverse axis, Radiology, Jan. 1960, Vol. 74, 19-26.

Displacement of the kidney is generally associated with rotation, which may occur around any of the 3 axes, the paper here deals with rotation around the transverse axis of the kidney.

The rotation around its transverse axis may be recognised on anteroposterior roentgenograms of the abdomen or on urograms. It is manifested in a shorter roentgen image of the kidney, blunting of the lower pole, shorter longitudinal diameter of the calyceal system, and a higher position of the uretero-pelvic junction. The rotation almost always occurs with the lower pole displaced anteriorly. Rotation round the transverse axis may result in a "palpable mass" in the renal region, the mass is produced by the anteriorly displaced lower pole.

Rotation around the transverse axis may be a useful sign in recognition and localisation of abdominal masses. This type of rotation is relatively common in tumours of the kidney located either in the upper or in the lower pole, and in cases of a mass adjacent to one of the extremities of the kidney. It may accompany enlargement of the liver, and spleen, or it may accompany enlargement of the gallbladder, and is relatively common in cases of adrenal tumours. It may be concluded that rotation of the kidney around its transverse axis should arouse suspicion in this direction and initiate a search for the cause, especially when the rotation is associated with proximal displacement of the kidney.

Rotation around its transverse axis is rather commonly associated with ptosis of the kidney and has also been observed following surgical mobilisation of the kidney and after nephropexy. It should not be confused with abnormally small (contracted or hypoplastic) kidney or with a renal cyst or tumour.

Rotation should be excluded when the size and shape of the kidney are to be evaluated on the basis of anteroposterior roentgenogram.

6 radiographs.

S. N. Deboo, Bombay.

J. H. Middlemiss. Haemophilia and Christmas disease, Clinical Radiology, Jour. Fac. Radiologists, Jan. 1960, Vol. XI, 40-50.

The etiology and biochemistry of the two above conditions are as yet incompletely understood, but the genetics of the two conditions are similar. Christmas disease is usually less severe in its clinical manifestations than haemophilia, but the effects of a severe Christmas disease may be similar to those of a moderate haemophilia. Differentiation between the 2 conditions is by laboratory diagnosis. Although the author uses the term haemophilia in this paper, all that is described may be equally applicable to Christmas disease.

Symptoms of this disease commence in infancy and are commonly most severe before puberty, and can all be attributed to haemorrhage. Thus exsanguination may result from simple tooth extraction. Severe trauma may give rise to large haematomata, *e.g.* in retroperitoneal area, or in pelvic cavity. Occasionally profuse haematuria may occur as a result of minor urinary infections. In infancy, bleeding in bowels may result in intussusception. Haemorrhage may occur into any joint, sub-periosteal haemorrhage may give rise to the so called haemophiliac pseudo-tumour. Repeated haemorrhage may lead to joint damage with development of chronic articular disease.

Radiologically 3 changes are manifested. (1) haematomata in the soft tissues, particularly in body cavities, may produce characteristic picture, *e.g.* retroperitoneal haematoma may be recognised by scolioses, concave to the affected side, by the displacement of bowel shadows away from the swelling, and by obliteration of retroperitoneal markings. (2) in children intussusception may occur, in such cases a plain radiogram will enable a diagnosis. (3) in bony skeleton, manifestations may be due to (*a*) changes due to intra-articular haemorrhage, resulting in haemarthrosis. The blood clot causes development of secondary osteoarthritis, with narrowing of joint space, and changes in subchondral bone, sclerosis and cyst. In children it may lead to accelerated growth of the epiphyses in the joint. Advanced maturation of the ephiphyses may result in increased length of limb or in early fusion with shortness of the limb. (*b*) Intraosseous haemorrhage may occur, and in long standing arthritis produce subchondral cysts. In growing epiphysis, it may produce changes indistinguishable from aseptic necrosis, *e.g.* in hip joint it may produce Perthe's disease. (*c*) subperiosteal haemorrhage is rare, and in such case may produce so called pseudo-tumour. (*d*) In children multiple horizontal white lines may be seen in metaphyses of long bones. In adults knee joint may show scalloping of the notch.

S. N. Deboo, Bombay.

M. Henzl, J. Horsky, J. Presl and M. Valenta, Pneumpelvigraphy of developmental malformations of the female internal genitalia, Acta Radiologica, March 1960, Vol. 53, 201-208.

Insufflation of gas into the peritoneal cavity for the roentgenologic demonstration of pelvic viscera in women has been used chiefly for estimating ovarian enlargement in the Stein-Leventhal syndrome and for the detection of tumours. It represents a valuable method for diagnosing anomalies of the female genital tract, particularly in disturbances of the general development (syndrome of gonadal dysgenesis, adrenogenital syndrome, pituitary dwarfism etc.), disturbances in the development of the urogenital sinus (atresia and stenosis of the vagina), in cases of primary amenorrhoea, menstrual disorders of the hypohormonal type in virgins and in uterine deformities.

In 3 years, the authors performed 170 pneumopelvigraphic investigations, 23 of them in suspected developmental abnormalities. In 2 cases, the examination failed because of obesity. The remaining 21 cases showed developmental defects of ovaries and uterus. They were :

A. Developmental defects of ovaries :

1. Ovaries absent (5 cases).
2. Rudimentary or hypoplastic ovaries (1 case).
3. Unilateral development of the ovary (1 case).
4. Developmental disturbances secondary to infection (2 cases).

B. Developmental defects of the uterus :

1. Congenital absence of uterus (4 cases).
2. Uterine deformities such as bicornuate, unicornuate, septate uterus etc. (7 cases).

The authors introduce Carbon dioxide, 1300 to 1600 ml. into the peritoneal cavity, then 3 anteroposterior films are taken.

The authors describe 6 cases, demonstrating various anomalies of the female genital tract from the more marked to the relatively less important ones, Pneumopelvigraphy

supplemented the clinical and laboratory diagnoses, chiefly in cases of gonadal dysgenesis, being of value, for instance, in the differential diagnoses between pituitary dwarfism and retardation of growth due to gonadal hypofunction.

Pneumopelvigraphy is considered to be a simple and relatively safe method is comparison to other exploratory procedures.

9 radiographs.

S. N. Deboo, Bombay.

George Cooper, Radiation therapy of benign conditions, Am. Jour. Roentgenol, March 1960, Vol. 83, 538-550.

In cellulitis, Furuncles, carbuncles, improvement after radiation therapy is due to action of ionising energy on the cellular exudate accompanying the inflammation. In acute infections, 100 to 150r in air is given at first. A 2nd dose of 75 to 100r 48 hours later is necessary and occasionally a 3rd exposure of 75 to 100r 4 or 5 days later. In chronic infections, an initial dose of 150r is followed by doses of 75 to 100r once a week for 3 to 4 treatments. A half value layer of 1·8 mm. Al suffices. Deeply indurated carbuncles require 0·35 mm. Copper filter.

In tuberculous cervical lymphadenitis, 4 to 8 treatments of only 100r air dose with a half value layer of 1 to 2 mm. Al, given at weekly intervals suffices. Care should be taken to minimise thyroid gland exposure, and it is good practice to protect the trunk.

In chronic sinusitis in children, in treating only the antra, a lead shield with opening just enough to expose one antrum is used. 50 to 100r in air with a half value layer of 2 to 4 mm. Al are given to each antrum 2 to 3 times a week for a total air dose of 200 to 600r to each antrum. In adults, it is found that patients usually suffer from hay fever or asthma. Here the antra and ethmoids may be given a single test dose of 200r in air, with a half value layer of 1 mm. Cu. When this is followed by a purulent nasal discharge, exacerbation of hay fever or asthma, in 24 to 72 hours, further irradiation is followed by improvement in hay fever or asthma.

In acute and subacute non-suppurative thyroiditis, a radiation dosage apt to impair functioning of the thyroid gland must be avoided. Each side of neck may be given 100r in air through directly opposing portals for 3 to 8 treatments. Half value layer is 1 mm. Cu. Cases coming to irradiation are those which have not yielded to steroid therapy. The smallest possible cone and careful shielding are used.

For warts, the usual verruca is given 300r in air, half value layer 1·2 mm. Al, once a week for 3 weeks. If the lesion is in a child and is superficial, a half value layer of 1·0 Al is used. Dead skin is pared away the night before each treatment.

In Herpes Zoster, therapy should be given to the ganglia (posterior root), with a radiation of half value layer of 1·3 mm. Cu. Usually 4 treatments with 200r in air four days apart are given. A few will require treatment for 10 weeks with a total dose of 2000r. In sub-acromial bursitis, smaller doses at 48 hour intervals or 150 to 200r in air twice a week are helpful.

S. N. Deboo, Bombay.

Thomas, J. Deeley, The effects of radiation on the lungs in the treatment of carcinoma of the bronchus, Clinical Radiology, Jour. Fac. Radiologists, January 1960, Vol. XI, 33-39.

The author here describes the physiological, pathological and radiological changes occurring in the lungs of sixty one patients treated for carcinoma of the bronchus by megavoltage therapy. (M.R.C. 8 MeV linear accelerator).

Whenever possible two non-opposed fields were used, so arranged that the spinal cord and the opposite lung received only a small dose of the radiation. In very large lesions, two opposed fields had to be applied to the front and back of the chest. A mean tumour dose of 4500 rads was given in four weeks, except where a field size of over 200 square cms. was required when the dose was reduced to 3600 rads.

Chest radiographs taken at follow-up attendances were compared with preliminary films, 2 radiological changes were observed. (1) An increase in the size of the opacity in the treated lung. (2) Evidence of lung fibrosis and shrinkage. In this group of 61 patients, there was an increase after treatment in the size of the opacity in 27 patients (44 per cent). The opaque area is frequently hazy in appearance, but there may be patches of consolidation coalescing to form a dense shadow. In no cases has the lung returned completely to normal. The majority of cases show evidence of lung shrinkage (without an initial increase in the opacity) with deviation of heart, trachea and hilum of the lung, tenting or elevation of diaphragm and contraction of ribs on the affected side. At the same time as fibrosis occurs in one lung, there is evidence of emphysematous changes in the unaffected lung.

After treatment, there is immediate palliation of most of the original symptoms. Symptoms occurring after treatment may be due to recurrence of the carcinoma, to the effects of fibrosis in the lung, or to subsequent infection of the diseased lung. Of 61 patients reviewed, 10 patients had bronchitis, these attacks continued after treatment. Of the remaining 51 patients, thirteen developed recurrent attacks of infection in the chest with pyrexia, dyspnoea and productive cough, increasing in severity with each attack. After several recurrent attacks of acute infection, one patient developed symptoms of a right sided heart failure. At post-mortem there was the picture of Cor pulmonale, marked fibrosis at the site of the primary tumour, but no evidence of recurrence of the growth.

The incidence and development of lung shrinkage was similar for patients treated by 8 MeV x-rays and 240 kV x-rays when a radical tumour dose was given.

S. N. Deboo, Bombay.

Robert G. Parker and John B. Holyoke, Tumours of the Testis, Am. Jour. Roentgenol, Jan. 1960, Vol. 83, 43-65.

The tumours of the testis are classified into 5 recognisable patterns. They are (1) seminoma (2) embryonal carcinoma (3) teratoma (4) teratocarcinoma (5) chriocarcinoma.

The seminomas are the largest of all testicular tumours. The embryonal carcinomas are the smallest of these tumours. A pure teratoma was not observed in this study. Teratocarcinomas showed characteristics of both teratoma and embryonal carcinoma with cystic and solid zones.

Clinically, the most frequent observation was that of an abnormal mass in the testis noted to be enlarging for more than one month. Some had gynecomastia. In some there was a history of undescended testis. Ascheim-Zondek test was not done consistently in this study, as it was thought to be unreliable.

Treatment is surgical or and radiotherapy. Study prior to treatment consists or chest roentgenography, excretory pyelography, blood count, urine analysis and a review of the histology. Nearly all cases were referred for orchidectomy. Preorchidectomy trial of irradiation was thought to be a useless procedure. Thorough dissection of the ipsilateral inguinal canal is recommended. If inguinal canal dissection has been thorough, this site need not be included in the field of irradiation. Regarding retroperitoneal dissection, it should be remembered that retroperitoneal lymph nodes can be bilaterally involved. In their series only 4 patients had retroperitoneal lymph node dissection.

Postorchidectomy irradiation of lymphatic drainage pathways, atleast to a level immediately above the renal pedicles is recommended for all adult patients, in the absence of demonstrated widely disseminated disease. In the presence of evidence of intra-abdominal periaortic spread, the mediastinal widening, or a left supraclavicular mass, the mediastinum and left supraclavicular area are also irradiated. The remaining testis and scrotum are not irradiated. The lymphatics adjacent to the iliac vessels, inferior vena cava and abdominal aorta to a level above the renal pedicles are irradiated through opposing anterior and posterior fields. Many patients were treated successfully with 400 kV and 200 kV apparatus. Since 1953, nearly all patients were treated with 2 mev Van de Graff apparatus, with abdominal coronal midplane doses of 2500-3000r in 4 to 6 weeks for seminoma and 3500-4000r in 6 weeks for embryonal carcinoma and teratocarcinoma.

S. N. Deboo, Bombay.

K. A. Newton. Total Thoracic-irradiation combined with intravenous injection of autogenous marrow, Clinical Radiology, Jour. Fac. Radiologists, Jan. 1960, Vol. 11, 14-21.

In the past, one of the limitation of very large field irradiation has been haemopoietic depression, obliging radiotherapists to discontinue treatment before a satisfactory radiation does had been given. A serious complication has been to the contents of the thoracic cage, with damage to the lung parenchyma. Therapy involving the thorax, produces maximum lowering, of both the total white cell and lymphocyte counts.

Many observers have remarked on the severe and sometimes permanently damaging effects resulting from quite moderate doses of irradiation. The author has been so much influenced by the acellularity that diagnostic marrow punctures are not performed in the region of the previous irradiation therapy, even if this has been given many years previously. The significance of a hypocellular marrow many years following irradiation can be interpreted as a lack of ability of the body to repopulate its own hypocellular marrow spaces.

There are 2 methods of reinfusion of autogenous marrow and thus avoiding prolonged leucopenia. The first is to aspirate the patient's marrow, to store it at -79°C. and then to reinject thawed marrow intravenously on completion of treatment. The 2nd method involves the aspiration of marrow from unirradiated areas at the end of a course of x-ray therapy and then to reinject it intravenously after suitable processing. There are 2 disadvantages, one is an anaesthetic is required, and it is perhaps unwise to subject a patient to a general anaesthetic immediately following irradiation to the entire thorax. 2nd is the risk of inflicting trauma to patients with a low white cell count thus rendering them liable to infection.

The patients considered to be suitable for total thoracic irradiation are those with pulmonary metastases from radiosensitive tumours which have been satisfactorily controlled either by high dosage radiotherapy or surgery. Seven patients were treated. In 5 of the 7 cases, the evidence points to successful repopulation either by stored or by fresh marrow cells. Irradiation of the thorax has been facilitated by the infusion of the marrow.

If total thoracic irradiation is to be attempted, the author suggests that the total dose should not exceed 2500r, and the daily dose should not exceed 150r.

7 cases.

S. N. Deboo, Bombay.

Chondrodystrophy (Achondroplasia) of the foetus obstetrics, Vishnu Sarma, Brit. J. Clin. Pract. 13 : 409-414, June 1959. (The Government Women and Children's Hospital, Egmore, Madras).

Achondroplasia may be readily recognized at birth : The trunk of the infant is of normal length ; the head is slightly enlarged ; the frontal bones are prominent and the glabella depressed the lower jaw tends to project ; the arms and legs are unusually short but broad and covered by thick folds of skin, muscle, and fat so that the extremities are maintained in a characteristically extended position. The condition appears to more common in females. Four of the series of 14 cases reported here were in males.

In the author's experience the cause of serious obstetrical trouble has invariably been the large foetal head.

Indications for roentgenography are the presence of polyhydramnios or a suspicion of cephalopelvic disproportion. The striking features in prenatal radiographs are the extremely short extremities in relation to the length of the trunk. Other conditions to be looked for include a large head with normal calcification, the depressed glabella with a prominence of the frontal region, the demonstrations in exceptionally good films of bony protuberances in the region of the formen magnum, a lumbar curve, and abnormal shortness of the bony portion of the ribs. One case was diagnosed correctly antenatally despite poor contrast in the films due to exccessive polyhydramnios.

Three cases are presented in detail.

2 Roentgenograms.

8 Photographs.

1 Table.

Vishnu Sarma, Madras.

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