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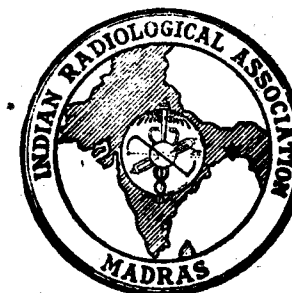
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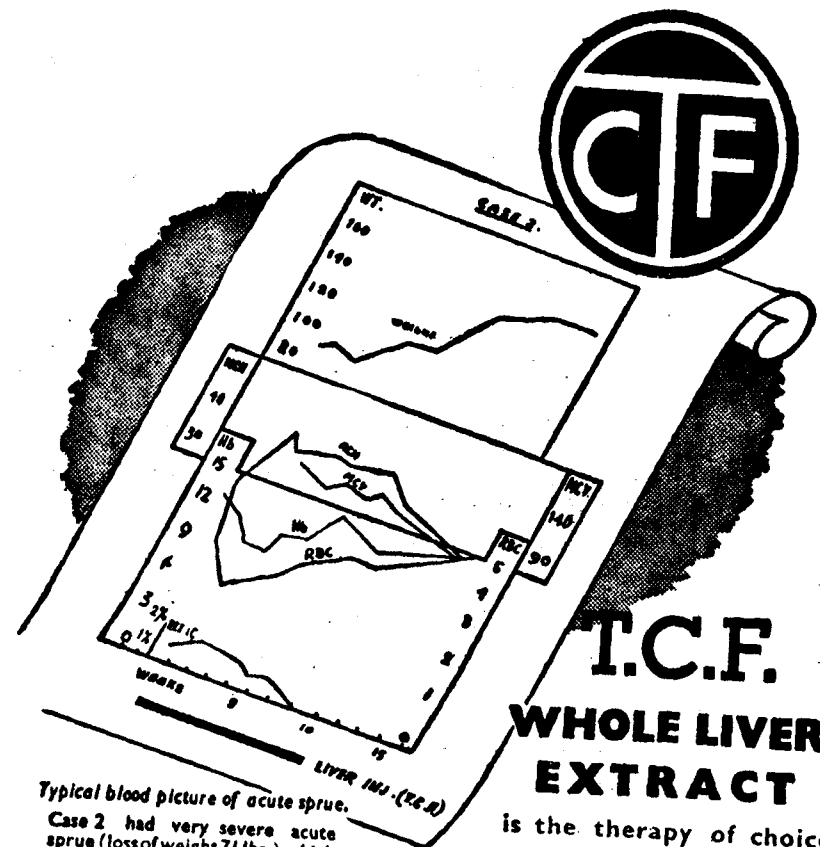
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PRESIDENT'S ELECTION

Drs. K. P. Mody, of the Tata Memorial Hospital, Bombay, RAI, JAYARAM and myself were duly nominated by several members of the Association. Drs. RAI, JAYARAM, and myself having withdrawn in favour of Dr. K. P. Mody, it gives me great pleasure to announce that Dr. K. P. Mody, has been unanimously elected as President of the Indian Radiological Association for 1948 and the Second Indian Congress of Radiology in December 1947.

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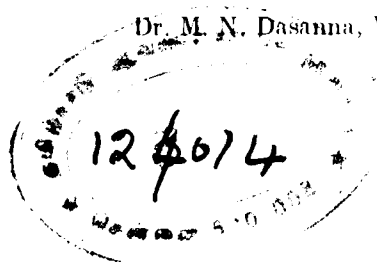
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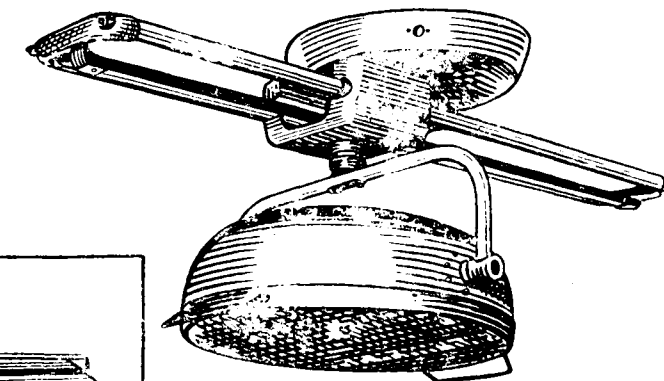
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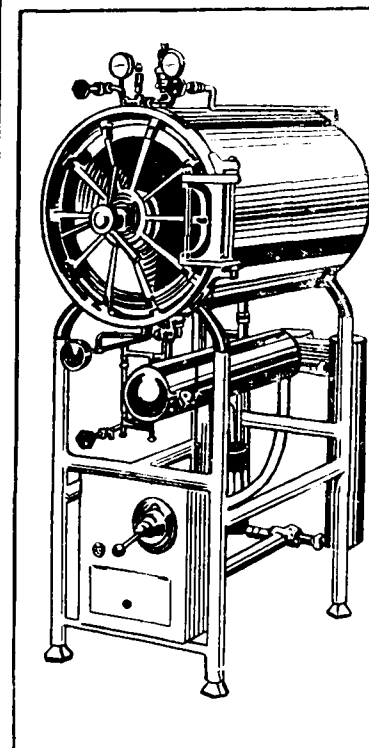
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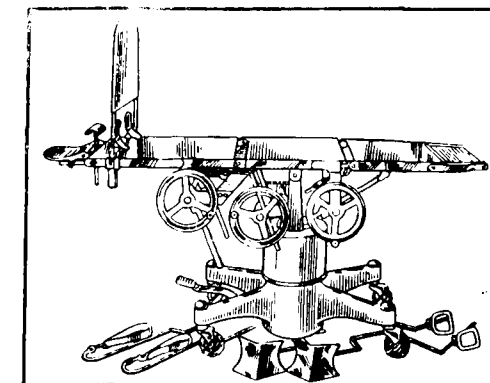
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AUGUST, 1947

No. 3.

Cancer of the Breast with Unusual Features

DR. K. P. MODY, B.A., F.C.P.S. (Bomb.), D.M.R. (Eng.).

HEAD OF THE DEPARTMENT OF RADIOLOGY, TATA MEMORIAL HOSPITAL, BOMBAY.

CARCINOMA of the breast is a very prolific subject. It can be discussed from several points of view. Unlike cancer in other locations, which usually follow a routine course with but slight variations, every case of breast cancer presents an individual problem.

There are cases, fortunately few and far between, which can rightly be described as fulminant. Whatever line of treatment is followed, the disease progresses rapidly to a fatal termination. These are usually cases in young women and in association with pregnancy and lactation. Then there is the large group who survive from 3 to 5 years, this is the average type of case. A small percentage, some authorities put it down as high as 20%, survive 5 years and more without any treatment. And lastly a few cases live for a number of years with or

without disease and ultimately succumb to it.

Why should breast cases behave so differently from the others? In the first place, a breast cancer does not cause nutritional disturbance by mechanical interference with the intake of food, nor does it upset the excretory functions of the body. Cancer of the tongue and oro-pharynx, cancer of the larynx and hypo-pharynx, Cancer of the esophagus and stomach, directly interfere with the intake of food owing to pain on swallowing, difficulty of swallowing and interference with gastric digestion. Cancer of the intestinal tract and cancer of the cervix interfere with the excretory functions of the bowel and urinary tract. These untoward effects appreciably alter the prognosis in a given case, apart from the deleterious effects of the neoplasm on the body metabolism. Breast

cancer kills through metastasis to distant organs, whereas in cancer of the oropharynx, for instance, the patient succumbs through local manifestations, pain, infection, broncho-pneumonia etc. Hormonic influences have been proved to play a predominant role in breast carcinoma, whereas it is not yet determined whether they have any influence on cancer in other locations. Perhaps there are factors inherent in the pathology of breast tumours which might also play a part in determining the wide variations met with.

The effects of radiation on breast carcinoma also present wide variations. On the whole it may be said that these tumours are radio-resistant. Even in cases which clinically appear to have responded, active cancer cells have been found on subsequent operation. It must be emphasised that radiation should not be the method of choice in an operable case, it may be used as a supplementary method, pre or post-operative or in cases unsuitable for radical surgery. A few cases have been collected from a large series that illustrate and emphasise the extreme chronicity sometimes met with. 7 cases have been recorded, who have survived from 9 years to 25 years after the first symptom, some with metastasis, some without, and all of them presenting active disease at the time of observation.

1. An Anglo-Indian lady aged 42 was operated by a well-known surgeon in 1937. Radical mastectomy was done on the left side followed by post-operative radiation. She came to the Tata Memorial Hospital in 1941 with recurrence in the scar. X-ray treatment was given and the recurrence subsided. She came back in 1943, two and a half years after, with metastasis in the sternum. There was a painful tender lump on the Manubrium Sterni, which showed partial destruction on X-ray examination. Though the lump did not completely disappear, her pain was markedly relieved and she was much more comfortable. She came back 2 years later, in 1945, with further metastasis on a different segment of the sternum. This was again subjected to deep X-ray treatment and the lump disappeared. She came back in May 1947 with left neck nodes markedly enlarged, hard and fixed lump occupying the entire side of the neck associated with pain and marked discomfort. Radiation was pushed on to 3,400 r with a 10/10 cms. cone, the other factors being 200 k.v. 50 cms. distance, 5 Cu and 1 Al. filter. When the course was concluded there was marked skin reaction and the glands were just slightly regressed. She has not come back for a follow up, staying as she is out of Bombay. She is still alive, 10 years after the 1st appearance of symptoms and 6 years after the recurrence, and 4 years after

bone metastasis. As she had her operation by an outside surgeon, no biopsy record could be obtained.

2. Christian lady, aged 60, was operated at Goa 12 years back for a tumour in the right breast. She came to the hospital in April this year with a recurrence in the scar of the original operation. Radical mastectomy was done and the histological findings were those of a scirrhus carcinoma. Axillary nodes were found enlarged at the operation. A course of post-operative X-rays was given. The patient went to her native place after an uneventful recovery. She was well for 12 years before she developed the recurrence on the operated side. Considering her past history it may be safely presumed that she will keep well for a number of years, very likely succumbing to natural causes rather than to the disease itself.

3. Hindu lady, aged 57, came to the hospital in December 1946 with a lump in the right breast. She was operated 8 years back for a tumour in the left breast, for which a Radical Mastectomy was done. She kept well for 8 years when she developed this new lump in the right breast. Simple mastectomy was done and a course of post-operative treatment was given. The interesting question arises whether this new development in the right breast could be considered as a metastasis from the original

lesion on the left side or a second cancer. Cross metastasis is often encountered, through the lymphatic channels, in which case the prognosis is very poor. If on the other hand it is considered as a second independent lesion, the prognosis would be more hopeful. It is difficult to decide and time alone and the further course of the case would point one way or the other. The patient was well for 8 years without any incident, and has gone home after the 2nd operation and is well so far.

4. Parsi lady, aged 58, came to the hospital in 1942 with a swelling in the right supra-clavicular region. The swelling was hard, and fixed and was clinically a mass of metastatic nodes. The history given was that in 1922 she was operated for carcinoma breast, left side. There was the scar of a radical mastectomy. She was given post-operative treatment with a radium pack. In 1926 she developed left supra-clavicular nodes, these were treated by deep X-rays and the glands subsided and she kept well till August 1943, i.e., for 21 years after her operation, when the right supra-clavicular group became involved. She received X-ray treatment and the glands markedly regressed. She kept well till November 1946 when the right supra-clavicular group again got affected. She also developed hoarseness of voice due to paralysis of the right vocal cord. Deep X-ray was administered,

but without much effect. She died in July 1947 from pulmonary metastasis. This case is remarkable in having survived 25 years from carcinoma breast ultimately succumbing to pulmonary metastasis. No biopsy report was available from the original operation.

5. Parsi lady, aged 72, came up for private consultation for a lump on the top of the skull. In trying to get out of the car she bumped her head since when it developed into a swelling, gradually increasing in size. She gave a history of a lump in the breast in 1939, discovered accidentally by her physician to whom she had gone for a routine check up for her general health. This happened in London where she had gone on a holiday. Radical mastectomy was done and post-operative treatment was given. She kept well till she hurt her head whilst getting out of the car. X-ray examination revealed an area of destruction in the parietal bone, an obvious metastasis. She received X-ray treatment and the lump subsided. 3 other smaller lumps developed and in a few weeks multiple small skin nodules came up on the scalp, almost the entire scalp was studded with these. She died in May 1947 of haemorrhage from these nodules, 8 years after operation. She survived the operation for 6 years without any evidence of disease. Injury prior to development of bone metastasis is a frequent happening,

the cancer cells circulating in the blood settle down in a weak spot. A special feature in this case is the skin metastasis on the scalp. They usually occur round about the operation scar and on the chest wall.

6. Parsi lady, aged 60, came for private consultation for hoarseness of voice and pain on the left side of the chest. Laryngoscopic examination revealed left vocal cord paralysis. X-ray examination showed left sided pleurisy with effusion. She was tapped several times and she would fill up again in a few days. There was no fever nor cough. The fluid was reported to be a transudate containing lymphocytes and red cells. No multinucleated cells suggestive of malignancy were seen. She developed pressure symptoms such as spasmodic dysphagia dry brassy cough and hoarseness of voice. On further X-ray examination the posterior mediastinal space was blocked by a mass of glands. Going through her past history, she had been operated in 1934 and a radical mastectomy was performed on the right side. Post-operative radiation was given. She kept well till February 1945 when she first came in complaining of hoarseness of voice and pain in the left side of the chest. The recurring effusion, the pressure symptoms, the X-ray appearances all pointed to metastasis in the mediastinum and pleura. She died in May 1947, 13 years after operation

for carcinoma breast and with final symptoms and signs of pulmonary metastasis.

7. A Parsi lady, aged 52, was admitted to the hospital complaining of pain in the back, hips, shoulder and ribs. X-ray examination showed rarefied areas of bone metastasis. The history was that she had a lump excised from the Breast in London in 1936. Clinically the lump appeared to be a fibro-adenoma and so only the lump was excised. But on histological examination it turned out to be a adeno-carcinoma. Radical mastectomy was therefore done after a few days. She kept well till the middle of 1946, that is for 10 years after the operation, when she went to a surgeon complaining of pains in the back and hips. X-ray examination was at first negative, but as the pain persisted she was X-rayed again after 2 months when metastatic deposits were evident. She was put on Pethidine and deep X-rays were given with relief from the pains. More spots developed in the shoulder, scapula and ribs. Prior to giving her deep X-rays injections of Testosterone were tried, but unfortunately were given up after a few doses, as she stated her pains grew worse. She is at present undergoing X-ray treatment, with already some benefit after 1000r. This lady kept well for 10 years after the radical operation before when she started getting pains. It is the usual experi-

ence that X-ray examination in the early beginning of metastasis is invariably negative. It is only when a fair sized area of bone is destroyed that X-ray examination reveals its presence. It is well worth remembering that one should not withhold X-ray treatment if pain has developed, even if the X-ray examination is negative. The operative procedures adopted in her case were unfortunate according to modern standards. It is the teaching that any lump in the breast should be excised and frozen sections examined whilst the patient is on the Table and if malignancy is detected, radical should be done there and then. This 2 stage procedure in her case was necessitated as the surgeon must have thought that the case was of a benign growth clinically.

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A large volume of statistical data is available from different centres for survival rates of cancer in different parts of the body. In a general way, a five year period is taken for the compilation of such data, arbitrarily based on general experience that if a patient survives 5 years he may be said to be cured. This works satisfactorily for the majority of cancers but when breast tumours are evaluated this limit is found insufficient. A ten year period is more rational. Prognosis in breast cancers should be guardedly given. There are too many factors to be considered. The tumour may be small and yet there

may be already distant metastasis which cannot be felt clinically nor can they be made apparent by X-ray or other investigations. Axillary glands may not be palpable and yet on operation they are often found involved. In other cases axillary glands may be felt prior to operation and yet on histological sections they are found to be inflammatory. Seemingly hopeless cases may drag on from month to month and what appears to be an early case may die within a few months. Recently there was a case of an elderly lady with advanced cancer with a large ulcerated lesion involving the skin a very distressing problem. We thought she would not last more than 6 months and she dragged on for 18 months. A doctor's mother was

operated in Paris by one of the best surgeons who told her that there was no necessity for further treatment, that she was a very early case and that she could return with an easy mind. She died with pulmonary metastasis within one year.

Comments:—The above study brings out interesting and unusual features.

1. The very slow course of the disease sometimes met with.
2. Patient still alive even 4 years after the first appearance of bone metastasis.
3. Cross metastasis seen in 2 of the cases.
4. Skin nodules on the scalp, very unusual in this location.

Radiation Therapy of Carcinoma Cervix Uteri*

RAO BAHADUR DR. P. RAMA RAU, D.M.R. (Vienna),
DIRECTOR, THE MADRAS RADIOLOGICAL INSTITUTE, KILPAUK, MADRAS.

THIS is an elaboration of the paper I read at the Scientific Session of the Centenary Celebrations of the Women and Children Hospital, Madras. I had to make that paper short as the time allowed to me was only fifteen minutes. Now, I would like to place special stress on the necessity for the use of higher voltage and the need

for radiation of lymphatic drainage areas supplementary to radium intracervically in all cases.

The first phase of treatment of carcinoma of the cervix was surgical. The second or radium phase developed as a natural sequence of unsatisfactory surgical experience. The third phase consisting in the addition of adequate external deep X-ray

* Paper read before the monthly meeting of the South Indian Branch of the Obstetric and Gynaecological Society of India.

radiation to the use of radium, followed the realisation that control of lymphatic involvement of the parametrium is the most important factor in the management of these cases. This was naturally an outcome of further observations of cases treated and the recurrences that occurred in the lymphatic glands. Early in the thirties it was from the Curie Institute, Paris, that reports were published that in cases of accidental deaths of category (Grade I) carcinoma of the cervix, autopsy revealed metastatic involvement of even the sacral group of glands, so that it was considered advisable even then to treat also Grade I cases with adequate external X-rays in addition to local radium applications. Success depends on the maximal doses being given at the first instance alone. It is also necessary to plan and complete the combined treatment within three or four weeks, before vascular changes and tissue reactions due to radiation commence. In our own experience, most of the cases that came into the clinic in the early years, were advanced recurrences in glands after intra-uterine and intracervical radium treatment with none at all, or not adequate enough of deep X-ray treatment externally. I briefly give the classification and results in 72 cases treated in the clinic between 1935 and 1943, of which 34 were Grades I and II, and 38 Grades III and IV.

No. of cases.	Alive for (in years.)											Alive Total.
	4	5	6	7	8	9	10	11	12			
Grades I & II } 34	9	4	4	5	—	5	1	3	1			32

Of these 34 cases, two were lost sight of within one year (1936 cases). All others are alive and were checked up to January 1947. This group includes one case who had in 1941 post operative radiation following vaginal hysterectomy. There was accidental damage to the bladder-wall and a VVF. This was repaired six months after radiation and the patient is well today. A second case had Radium outside in 1941 and no deep X-rays. She came in 1943 with a lump (recurrence in sacral glands) and since receiving external deep X-rays, is doing well today. Both these were Grade I cases.

No. of cases.	Lived for		Alive for (in years.)				Alive now Total.
	2	3	4	5	7	8	
Grade III and IV including 16 cases of recurrences after previous radium treatment only. 38	1	1	1	2	3	1	7

Out of 38 cases belonging to Grade III and IV, 28 died within one year; of these 16 were recurrences after previous radium, but no X-ray therapy. Excluding these 16 cases all of whom were dead within one year, 7 (all Grade III cases) out of the remaining 22 are alive for varying periods. Two cases of Grade IV developed pelvic cellulitis, with abscess formation which burst into rectum and drained; one lived two years; one lived three years. A third case lived for 6½ years. Mrs. P.P.

admitted 16-3-1938, age 49—Large fungating growth—received 6000 mg. hrs. of Radium on mould and intracervically, followed by deep X-rays (200 k. w. 1 mm. cu.+1 mm. Al. Filter, 15×15 cm. hypogastric and sacral fields, 2000 r to each field). On 5-8-1940 she returned having had

herself for sciatica. Radiography revealed spondylitic changes. There was no local recurrence; laparotomy revealed secondaries in front of the 1st piece of sacrum. It was considered best to leave her alone. She died in September 1944. Lived for about 6½ years. She was a rather



FIG. 1.—Drawing showing position of main lymph vessels draining the cervix uterii. The dotted ones lie behind the structures shown.

—(Reproduced from 'Radiology,' Page 523, Vol. 36, No. 5, May, 1941.)

a large hæmorrhage. Local condition: Dome of vagina closed and cervix atrophied; parametria free. Curettage showed no evidence of malignancy. 50 mgms. of Radium were inserted and kept in for 24 hrs. Local condition was all right on 1st February, 1943 when she reported

heavily built lady and 2000 r to hypogastric and sacral fields with the 200 k. v. apparently was not adequate enough.

A review of the anatomical descriptions of the lymph channels leading from the cervix uterii gives the following data:*

* Drawn mainly from Stone and Robinson's article in Radiology, May 1941.—'Carcinoma of the Cervix.'

There are from 5 to 8 lymph channels from the region of the cervix. These are grouped into 3 sets: (1) First are those that drain laterally, and slightly anteriorly, to the iliac nodes lying adjacent to the external iliac artery. The lowest of these nodes lies on the anterior surface of the obturator canal, and is known as the obturator node; (2) the second group is comprised of those that drain postero-laterally to the hypogastric lymph nodes on the hypogastric (internal iliac) artery near the bifurcation of the iliac arteries; (3) those of the third group drain posteriorly over the posterior vaginal fornix through the uterosacral ligaments. They pass around the rectum to the sacral nodes that lie beside the sacral ganglia or near the midline beneath the sacral promontory.

From the primary nodes, channels lead to the lumbar nodes lying near the midline just below the bifurcation of the aorta, and therefore, on the anterior surface of the fourth and fifth lumbar vertebrae. Further extensions from these pass upward along the aorta. At times, there is a direct channel from the cervix to the lumbar nodes, but apparently this pathway is seldom followed by carcinomatous metastases. There are also secondary channels from the iliac nodes to the inguinal nodes, which are, however rarely involved.

Several lesser lymph nodes are found in the parametrium. A fairly large one, called the ureteral or Championnier node, is frequently located near the point at which the uterine artery crosses the ureter. When disease is present in the cervix, atypical nodes apparently develop in the walls of the main lymphatic channels.

It is well to remember that none of these channels pass through the free portion of the broad ligament, nor are any of the nodes located there. Both the lymph channels and nodes draining the cervix are in the relatively fixed structures of the pelvis and consequently do not move about as the patient is placed in various positions.

The anatomy of the lymphatics, however, does not indicate where metastases are most likely to be found. This information is found in reports from the operating table and the autopsy room. TAUSSIG in 1934, after a study of the literature, summarised his findings, which is quoted below. The groups to which he refers are those of the League of Nations classification:

"1. Cancer is found in from 25 to 33 per cent of lymph glands removed in Group I operable cases, in from 45 to 50 per cent of lymph glands removed in advanced (Group II or Group III) cases, in about 66 per cent (two thirds) of the cases coming to autopsy (Group IV.)

"2. Considerable uniformity is manifest in the anatomic spread of lymph gland metastasis. Where lymph gland cancer is present, it is limited in about

95 per cent of the cases to the so-called Grade I gland meaning thereby the iliac triangle or hypogastric glands, the obturator glands, the ureteral or Championnier glands, and the sacral glands. In order of frequency these glands are involved: (1) iliac; (2) obturator; (3) ureteral; and (4) sacral. Grade II glands include the lumbar aortic glands, the inguinal glands

as an overflow after the cancer has filled up glands of Grade I distribution.

"4. Enlarged indurated glands do not necessarily mean cancer metastasis, nor do small soft glands exclude such a possibility. Microscopic section is required to establish a positive diagnosis.

"5. While glands are most apt to be involved if the parametrium is infiltra-

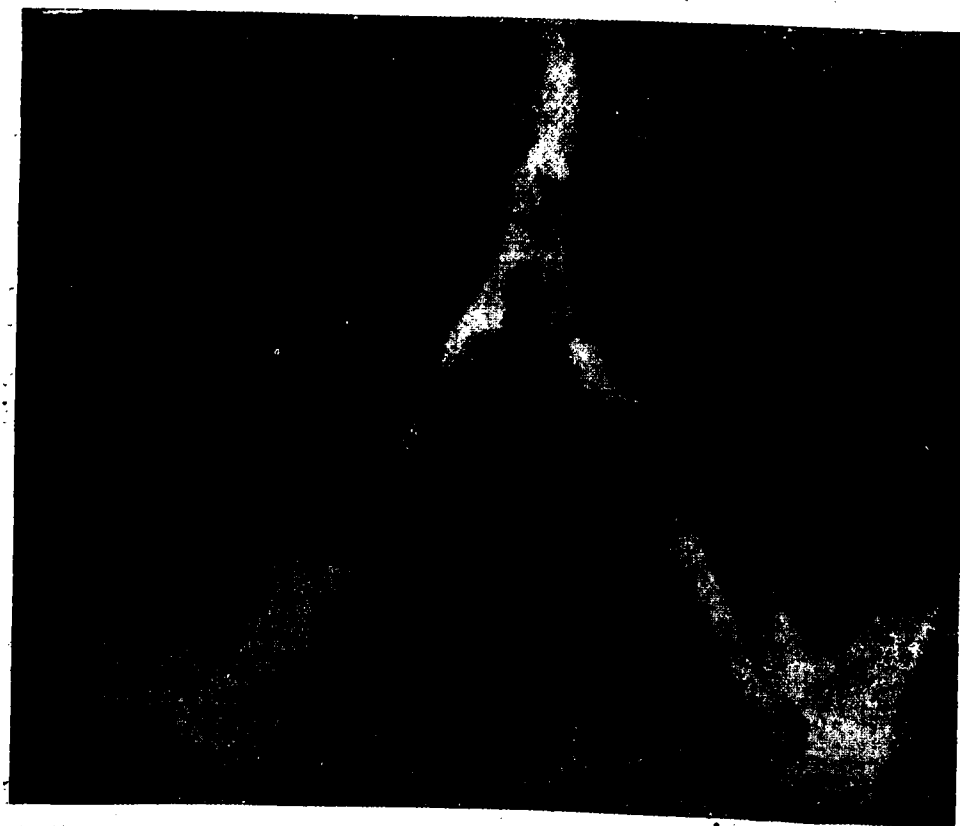


FIG. 2.—Radiograph of injected arteries showing level of bifurcation of the common iliac arteries.

—(Reproduced from 'Radiology,' page 524, Vol. 36, No. 5, May, 1941.)

and the glands over the common-iliac vessels. These Grade II glands are involved in addition to Grade I glands in Group I and Group II cervical cancer in from 5 to 10 per cent of the cases, but practically never are involved as a primary metastasis without any cancer in Grade I glands.

"3. It seems a fairly constant rule that Grade II glands become involved only

ted, it may happen that glands are involved without cancer in the parametrium and the parametrium may be extensively invaded without gland metastasis."

We know secondary infection plays an important part in all cancers. Swollen glands may be secondary to infection, but at the same time, one cannot exclude the possibility of

metastasis in those glands. We might find an easier analogy in oropharyngeal and laryngeal growths, where glands are accessible for removal and pathological examination. I may digress here and say that in this latter group of cases we, as a routine, irradiate lymphatic drainage areas. Actually, in a few cases of oropharyngeal and laryngeal growths where the field of irradiation included the upper and middle cervical glands, few years later, we had some of the cases return to us with recurrence in the deep inferior-cervical group behind the sterno mastoid.

It is, essential, that in cancer cervix the pelvic lymphatic system including hypogastric, obturator, ureteral and sacral glands should all be adequately irradiated about the same time as radium is applied. And it is also to be remembered that each individual case has to be considered on its own individual, clinical and other data for chalking out a line of treatment.

Microscopic examination of metastasis in glands is only possible when operative procedure is adopted which now-a-days is considered not as good as radiation. Autopsy and operative findings done by previous workers have enabled us now, to establish that when we irradiate cervical cancer we should also at the same time, plan an adequate dose of radiation to the lymphatic and other areas of immediate extension of malignancy.

A technique of combined radium and external deep X-ray developed by us has been very satisfactory as our result show, especially, after the installation of high voltage apparatus of 400,000 volts in 1938. The whole combined course of treatment takes three to five weeks according to the degree of involvement and extension. There was no need to break treatment except in cases where occasionally complications arose. A supporting therapy with liver extract, iron and vitamin B (last, in fairly large doses of 50 to 100 mgms. parenterally daily) has minimised blood changes and roentgen sickness. Weekly blood counts have shown no change except some drop in the W.B.C.—decrease in lymphocytes mostly—which returns to normal within three or four weeks after cessation of radiation therapy. The supportive treatment for the haemopoetic system is continued during this period. With the higher voltage, there has been no complications which could not be controlled, necessitating breaks in treatment, like severe diarrhoea and extreme sickness nor that degree of radio-epidermitis of irradiated skin fields found with the application of lower voltages like 200,000-or 180,000.

Investigations.—Stage and extent of disease is first of all ascertained by a thorough local examination.

With the speculum and good light, the conditions of the cervix and dome

of the vagina are viewed. This is followed by a vaginal examination, digital, bimanual, and finally a rectal examination which gives more information regarding the mobility or tory, rectal examination gives the data we require.

Two other tests are Chrobak's probe test and Schiller's Lugol's

Anterior Field with the 400 k.v. Maximar apparatus.



FIG. 3.—Radiograph made after set up of patient with 15 x 15 cm. field 20 cm. F.S.D. Showing "field area" covered by the beam. Large pelvis 15 x 20 cm. field.

otherwise, of uterus and appendages, extent of parametrial infiltrations etc. In cases of cauliflower growths where vaginal examination is not satisfac-

iodine test. The latter should be done with Lugol's watery solution of iodine and not the spirit solution like tincture of iodine.

Chrobak's test is as follows:—The cancerous area of cervix being soft and fragile, a probe gets into the tissue easily, but not in chronic ulcer which is hard and resists the probe.

Schiller's Lugol's Iodine Test: A swab dipped in Lugol's solution is pressed against the cervix. Upper vagina stains deep brown except the endocervix. Cancerous tissue does not stain on account of absence of glycogenic function in malignant cells. Chronic ulcer stains brown. Glandular epithelium of endocervix will not stain. This test cannot be adapted in malignancies of the vulva or skin. This also localises the cancer, which remains pink as against dark brown stain all round and helps in biopsy too.

We have not done biopsy as a routine in our cases—as in the few cases in which both biopsy as well as Chrobak's and Schiller's test were done, the results were identical. When we do a biopsy, we always take a fair piece of tissue and not too small a one. As far as grading according to BRODER and the hypothesis of favourable or unfavourable prognosis and degree of radio-sensitivity attached to the four gradings, present tendency is not to depend on such a theory. Sections from different parts of the same growth may show variations in gradings and so becomes unreliable. It is best to depend on clinical data as to extent and extensions of lesions

and the physical build and constitution of the patient.

I would like, however, two additional investigations to be made as a routine measure. Firstly, a cystoscopic examination and secondly, an intravenous urography. Cystoscopy will reveal any congestion or prominent blood-vessels in the mucosa of the bladder which may mean early stages of malignant infiltration and the possibility of a VVF as a later complication. Intravenous urography will tell us if there is any obstruction to ureters causing renal complications, as quite a number of patients who died of cancer cervix are known to have died of urinary complications and not directly due to malignancy and its extension.

Methods of radiation amongst continental workers:—Radiation therapy of cancer cervix was first developed by REGAUD, LACCASSAGNE, and COUTARD at the Curie Institute Paris, and by FORSELL and HEYMAN at the Radiumhemmet Stockholm. These and several others adopted methods consisting of applying Radium into the fornices with the Colpostat in addition to the cervix proper, to enable adequate irradiation of parametria. Additional external radiation was also given. External therapy consists in irradiating through 4 to 6 fields around the pelvic girdle (each 10 x 15 cm., two anterior, two posterior and two lateral) each receiving 2,000r (2 fields daily, each field 200r) with a tension

of 180,000 volts or 200,000 volts and 1 or 2 mm. Cu. filter; with some workers only $\frac{1}{2}$ mm. Cu. filter. Internally 6,000 to 8,000 mg. hrs. of Radium is applied half intracervically, and half in the vagina. This is done in two or three sessions, three weeks apart or so. Some apply Radium after deep X-ray therapy, to you with the help of the following charts, the distribution of radiation and the principles involved.* (Fig. 4 & 5 vide page 101.)

I am using since 1938 a modified method of what is followed at the Mayo Clinic and feel gratified with the results. The main principle is application of Radium at intervals in

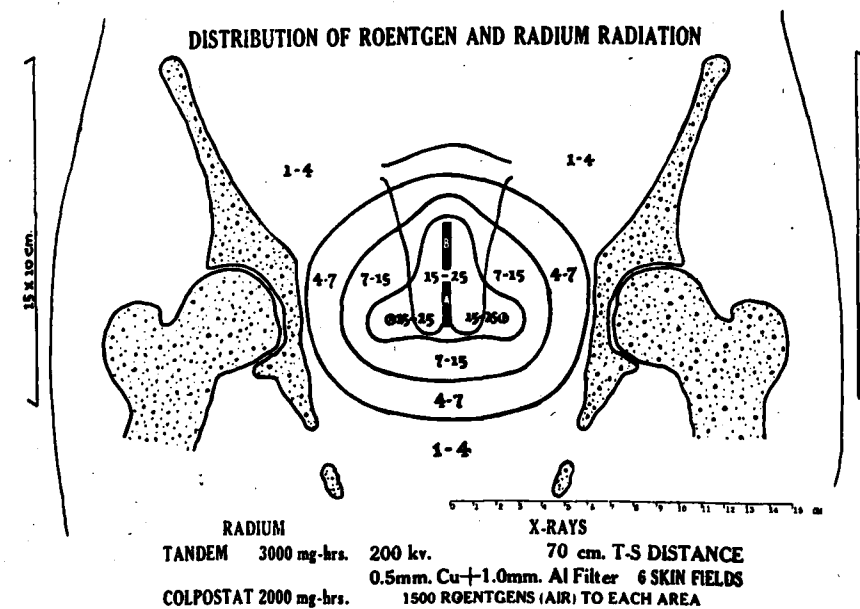


FIG. 4.—Front view showing distribution and lateral fields.
—(Reproduced from 'Radiology,' July 1936—Arneson)

others follow Radium with deep X-rays. The tendency in some clinics is to prefer giving deep X-rays first and when the tumour has shrunk, follow up with Radium. I shall not go into further details of these methods in this paper as there are plenty of observations published by various workers in radiological literature. I shall, however, demonstrate gradually increasing dosage, in view of existence of secondary infection. This consists in applying Radium at weekly or six-day intervals. First dose is 1,200 mg. hrs. or less, second 2,400 mg. hrs. or less, and a third, 2,400 mg. hrs. or more depending on the reactions to make a total of 6,000 mg. hrs. two thirds of the dose intracervically, and a third

* All the charts shown are not reproduced here.

in the vagina against the external os. During the interval between the Radium applications, external radiation with 400 k.v. 5 mm. Cu. + 1 mm. Al. filter H.V.E. 400 mm. Cu. through a hypogastric field 15 x 15 cm. in daily doses of 200r or 300r to make a total of 3,200r to 4,000r is given. (Air dose, which with irradiation of normal tissues from the sides which will be subjected to radiation when the lower voltage of 200,000 and multiple field technique is adopted. There will be a cumulative radiation effect, in the pelvis by this method, reaching the optimum concentration around 4 weeks or so. The general principle

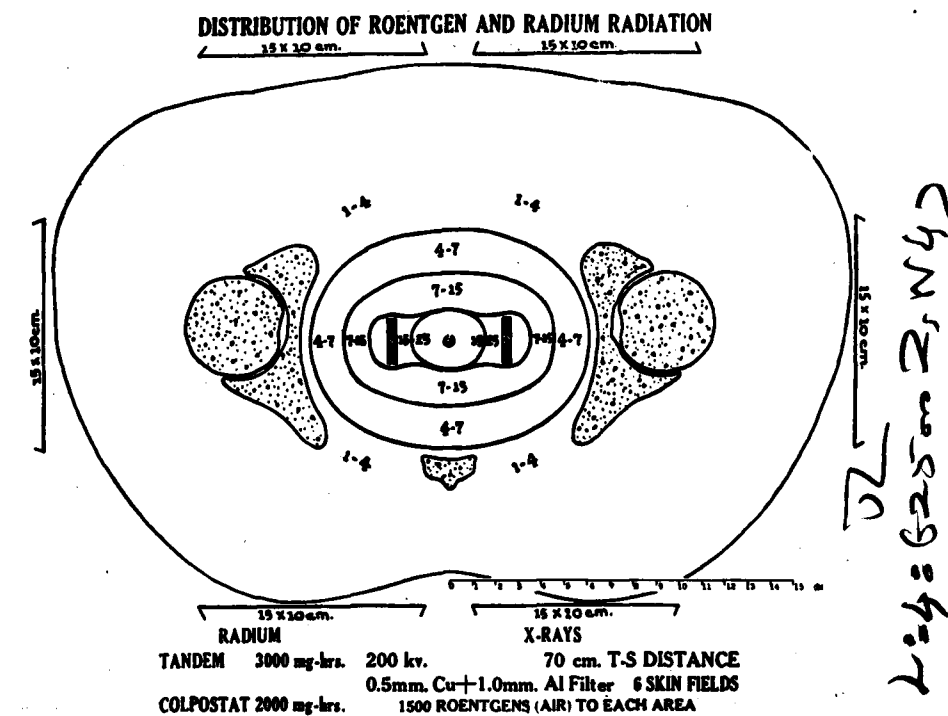


FIG. 5.—Cross section showing distribution and the 6 fields.
—(Reproduced from 'Radiology,' July 1936—Arneson)

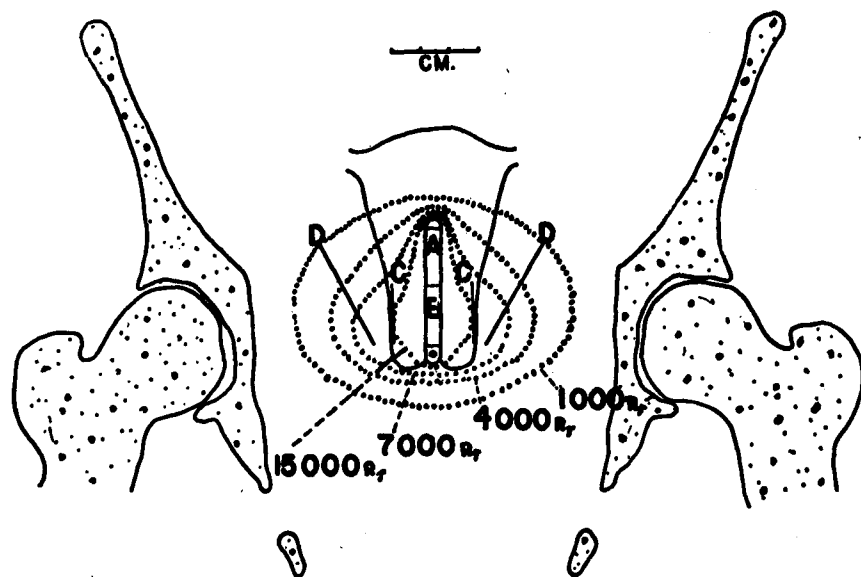
22% or so of back scatter gives around 50% or 1,600r to 2,000r at 10 cm. average mid-pelvic plane.) This will afford adequate irradiation of pelvic lymphatics and eliminates the necessity for application of Radium to the fornices. The higher voltage also eliminates unnecessary irradiation of normal tissues from the sides which will be subjected to radiation when the lower voltage of 200,000 and multiple field technique is adopted. There will be a cumulative radiation effect, in the pelvis by this method, reaching the optimum concentration around 4 weeks or so. The general principle is to spread 5 to 8 erythema doses to the parametria and lymphatics in the pelvis in addition to the more intensive radiation to the lesion. (Fig 6 vide page 102.)

All cervical cancers are infected growths, and it is necessary to clear up the secondary infection before

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Radium is applied; as else, high febrile reactions invariably follow. We usually start with external deep X-rays for the first 4 to 6 days, with daily vaginal washings with mild antiseptic douches and then make the first application of Radium. This is found adequate and no febrile reactions occur, particularly as the first the cervix in a suitable condition to make an intracervical application of Radium. By plugging the vagina with about 4 yards or so of six-inch gauze. Radium is prevented from slipping out of position and the bladder and rectal walls are held away from the Radium capsule. We have had no VVF or RVF in our

FIG. 6.—Distribution in gamma Roentgens for 6100 mgm. hrs. intracervical radium.
--(Reproduced from 'Radiology', April, 1943 Nolan and Quimby.)



Radium distribution curves in gamma roentgens; this with a 10 cm. depth average mid-pelvic external 400 k.v. X-rays dose of 1600r to 2000r reaching parametria and lymphatic glands (See Fig. 3) gives adequate radiation to required area in the pelvis.

Radium dose is only 1,200 mg. hrs. or so. In cases of cauliflower growths, Radium on a wax mould to fit the lesion is applied (dose of 1,200 mg. hrs.); this is followed by the administration of the entire dose of external radiation. At the conclusion of external radiation, one invariably finds series. Isodose curves will show how distance from source of radiation is the only method of saving rectal and bladder walls, as the radiation reduces in intensity from its source by "the inverse square law." If at a distance of 1 cm. from the source, radiation is 100%, at 2 cm. it

becomes 23.5%; at 3 cm. it is 9.2% at 4 cm. it is 5.5%; at 5 cm. 4% and at 6 cm. it is only 2.0%.

In grades III and IV, only high voltage 400 k.v. external radiation is given to a maximum of 6,000r by hypogastric and sacral fields alternately, each field receiving 3,000r without severe skin reaction, but allowing that depth dose of 3000r to an average 10 cm. mid-pelvic plane. After an interval of two months a small dose of Radium, 2,400 mg. hrs. is applied intracervically if conditions permit. Else, one has to be satisfied with the results of external radiation only.

A question often asked is the problems concerning treatment of cancer cervix associated with pregnancy. I have no personal experience in my clinic, but feel that an extract from the report from the Mayo Clinic may be given here:

"A study of 3,570 cases of carcinoma of the cervix observed at the Mayo Clinic in approximately 32 years revealed that pregnancy was present in 26, or 0.7%."

"No definite conclusions can be drawn concerning the relative value of irradiation therapy; however, it appears that operation is preferable in cases in which the lesion is operable and that supplementary irradiation increases the percentage of good results. This is in contrast to the relative value of irradiation

therapy and hysterectomy in cases of carcinoma of the cervix in the patients who are not pregnant.

"If the extent of the lesion permits operation and if the foetus is not yet viable, total hysterectomy is followed by irradiation; if the lesion is operable and the foetus is viable, cesarean section is followed by panhysterectomy and post-operative irradiation. In cases in which the lesion is non-operable and the foetus is viable, cesarean section is followed by irradiation; in cases in which the lesion is non-operable and the foetus is not viable, sufficient irradiation is employed to treat the lesion; incidentally, abortion occurs. When the lesion is operable, total abdominal hysterectomy has produced the best results. In 57 per cent of the cases in which this procedure was employed, the patients were free of recurrence five years after the operation."

I shall now come to the subject of hormones and malignant diseases, particularly because, the younger, the patient with cancer of the cervix, the more unfavourable has the end result been. Even on biopsy, the growth in younger women has been known to be anaplastic. Has this anything to do with Estrone in circulation? In the management of patients with skeletal metastasis from breast cancer, X-ray castration was advocated by AHLBOM as early as

1930, the effect of such treatment being to greatly reduce the circulating estrogen. LACCASAGNE and others suggested treating these cases with Androgen. The pronounced atrophy inducing effect of the male hormone on the ovaries is well-known and BEECHAM (in 1943) reported relief from pain and general improvement in some cases of advanced ovarian tumours and two cases of Grade IV cancer cervix by Androgen therapy. I have, as a routine, adopted X-ray castration of the ovaries in all cases of cancer of the breast referred to my clinic since 1937. I have tried additional Androgen therapy in one case only. Apparently it is worth trying the male sex hormone as an adjuvant therapeutic measure in malignant diseases in women, not only when the breast is involved, but also in cancer of the cervix and tumours of the ovary. It is perhaps not wrong to assert that the comparatively unfavourable course taken by cancers in young women is due to the active condition of the ovaries and the large amount of estrone in the circulation. Reports of cases of secondaries from prostatic cancer that have improved with Stilboestrol are forthcoming in recent literature.

The one case I treated recently with the male hormone is interesting—a case of secondaries in the bones—age 32 years—one breast was removed for carcinoma and post-operative radiation was given at another

Clinic, to the operative field and axilla (1945). No irradiation was given to the ovaries. One year later (1946) the patient developed a growth in the other breast. Radical operation and post-operative radiation at my clinic which included, irradiation to the ovaries. Castration dose was given to the ovaries. Six months later, she developed extensive osteoclastic lesions in the vertebrae, pelvic bones and the heads and neck of both femora. There was no local recurrence, nor in the axilla and supraclavicular regions. Androgen therapy with 25/50 mgms. of Testosterone Propionate (by injections daily) was administered for about six weeks until hirsutism appeared. Patient had almost immediate and symptomatic relief from pain, and the subsequent skiagrams showed recalcification and return of trabecular structure in the bones (this case will be reported separately with radiographs in a issue of this journal subsequent). This opens a new vista for thought—whether we could employ the neutralising effects of the female sex hormone in malignant diseases of the male and vice versa.

I wind up this paper by once again pointing out the principles involved in radiation therapy of carcinoma cervix uterii.

1. To adopt a technique of combined X-ray, and Radium therapy, the course to be completed from 3

to 5 weeks before radiation tissue reactions set in. This will be ideal in Grades I and II.

2. No large dose of Radium at any time; progressively large doses to make up the total Radium dose at intervals of a week, combined with deep X-rays.

3. In advanced cases—Grades III and IV, a preliminary course of the entire dose of external deep X-ray therapy only—to be followed two or three months later by Radium intracervically, if conditions permit.

4. Use of higher voltage of 400 k.v. which will save tissues which would otherwise be unnecessarily irradiated by multiple field technique which one has to use, if lower voltages of 180/200 k.v. is used. (There have been reports of late necrosis of the neck of the femur on account of the heavy radiations from lateral fields with the six-field technique.)

5. Bear in mind to treat secondary infection before application of Radium, as well as, after the course of radiation therapy, when tissue reactions are in progress.

Osteoclastoma

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AND

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OSTEOCLASTOMA forms about 20% of all bone tumours. tumours occurring before the fusion of the epiphysis were all confined to the metaphysis.

As per the figures of our institute it comes to about 25%. Its incidence before the fusion of epiphysis is not common. It is said to arise in the epiphysis. This view does not find general acceptance; according to this dissenting school, it arises in the metaphysis. In all cases seen by them, the epiphysis is fused and the end of the shaft could not any longer be called the epiphysis. Giant cell

The most common bones involved are the long bones; less common are the jaws, vertebrae scapula pelvis and small bones of hands and feet. Osteoclastoma is not commonly found in its early stage. It would have existed for sometime before the patient is referred to for roentgenologic examination.

we then have the characteristic soap bubble appearance. In an actively growing tumour this appearance is not well seen; in these it is evident after irradiation therapy when reossification takes place.

The tumour may extend into the neighbouring bones through fascial planes or ligaments or tendon. It may in some cases cause pressure absorption of adjacent bones. Where bony projections are present near the tumour it grows into them.

To sum up, the radiological features are—

1. Its essential nature of regular dissolution and expansion as compared to irregular destruction and infiltration in osteosarcoma.
2. Eccentric situation in the bone.
3. Curved line of graded density definitely, demarcating the tumour from the normal bone.
4. Absence of periosteal reaction.
5. Extension into adjacent tissues and bones.
6. The relative resistance of the sub-articular bone.

The following characterise the tumour becoming malignant.

1. Invasion into the shaft along the medulla, the curved line of demarcation being no longer well-defined.

2. Proliferative reaction of the periosteum.

It is often asked if all these radiological features are infallible;

Radiograph of an Osteosarcoma



FIG. 7.—There is expansion; but the abundant periosteal reaction and invasion of shaft with the loss of curved line of demarcation distinguish it from osteoclastoma.

can the surgeon solely depend on these in all cases or should he resort to a biopsy? Our experience does not allow us to answer this question with a simple 'yes' or 'no'. In cases with definite roentgenological findings biopsy is not necessary; where roentgenological findings are not definite and clinically malignancy is suspected a biopsy is advised.

Differential diagnosis.—The following conditions have to be differentiated from osteoclastoma:—

1. Plasmacytoma.
2. Adamantinoma.

3. Osteitis fibrosa of focal and generalised types.

4. Chondromata.
5. Bone cysts.
6. Osteolytic sarcoma.
7. Metastatic carcinoma.
8. Cystic type of tuberculosis.

Differentiation in certain cases is not possible only from radiological findings; clinical features have also to be taken into consideration. Sometimes it is necessary to repeat the roentgenologic examination at frequent intervals, so that the progress and nature of the lesion may be known.

Plasmacytoma:—The solitary type is to be differentiated. The trabeculae are few, well-defined and coarse; urine may show Bence-jones protein and sternal puncture, plasma cells.

Adamantinoma:—The line of demarcation from the normal bone is sharp, the trabeculae are coarse and sometimes the tumour gives a honeycombed appearance. It is not radiosensitive.

Focal osteitis fibrosa:—Though usually solitary other bones may show similar lesions, trabeculae are few and coarse, outline is sharp and progress is slow.

Generalised osteitis fibrosa:—There is generalised osteoporosis, blood chemistry shows changes and deposition of calcium in urinary tract may occur.

Chondroma:—It may be anywhere in the shaft, has a well-defined and clear cut boundary and on radiographic examination of the skeleton similar lesions may be found in other bones.

Bone cyst:—It has a clear cut sclerosed margin and may be situated anywhere in the shaft.

Osteolytic sarcoma:—There is no definite line of demarcation from normal bone, periosteal reaction and invasion of the tumour into the shaft occur.

Metastatic carcinoma:—The secondary deposits from thyroid have a soap-bubble appearance and this has to be borne in mind. Age and site as also the history or presence of primary lesion help in differentiation. Urine may show Bence-Jones Protein. These lesions have invasive and destructive properties.

Cystic type of tuberculosis:—Repeated examination at short intervals shows the cysts to coalesce; the articular surface later breaks down and ultimately the joint may be destroyed.

We would like to draw attention to the following features of diagnostic importance:

- (1) Arteriographic findings.
- (2) Characteristic pain of osteoclastoma.

Arteriography shows a very great increase in the number of arterioles

and venules both inside and outside the bone in malignant disease. This does not happen in any other bone disease. In osteoclastoma though there is increased vascularity, there is never the picture of increased

Treatment.—It is either surgical curettage or radiation. Surgical procedure had been the sheet-anchor for a long time till it has been found that this tumour is radiosensitive. For a time both methods were combined

Arteriograms of Osteosarcoma and Osteoclastoma



FIG. 8.—(a) Osteosarcoma—shows great increase in the arterioles and venules in the area of the tumour.

(b) Osteoclastoma—though there is increased vascularity, it is definitely not the picture seen in osteosarcoma—no increase in arterioles and venules.

arterioles and venules as in osteosarcoma. The pain in osteoclastoma is of a dull-boring type, in contradistinction to the very severe pain seen early in osteosarcoma. There is one characteristic feature about this pain; under irradiation therapy pain of osteoclastoma does not disappear soon, whereas in osteosarcoma relief of pain occurs very early.

with the hope that recurrences after curettage, which were not infrequent could be prevented. In fact we followed this method ourselves; in the earlier days the results looked satisfactory, but later with the added experience of treating larger number of cases, we have learnt to our cost that this combined treatment of surgical curettage followed by irradiation is dangerous. The effect of this

combined therapy is (1) there is delay in repair as irradiation causes damage to newly formed capillaries; (2) the tumour may become malignant. The increased irritation due to the double trauma of surgery and irradiation is supposed to be too much and is considered to be a factor in transforming a benign tumour into a malignant one, which accident is not infrequent in this combined method.

Though everybody is agreed that either surgery or irradiation is the line of treatment, there does not seem to be any definite agreement among surgeons and radiologists as to which is to be preferred. The surgeon claims that osteoclastoma requires his instruments and deft fingers; the radiotherapist is equally jealous and claims its treatment to come under the prerogative of his speciality. The choice between these two lines of treatment should depend on certain factors. Some cases are treated only by radiation, some only by surgery, while certain others are suitable for either method. The factors which determine the line of treatment are: (1) age, (2) site, and (3) extent. In young individuals where the epiphyseal union has not taken place surgery is the method of choice; irradiation in these cases by its effect on endochondral ossification interferes with the growth of the bone and so is contraindicated. In certain inaccessible sites as vertebra and pelvic bones, surgery is not possible. In extensive

tumours with gross involvement of bone, radiation is the method of choice as pathological fracture may occur after curettage. Small tumours where the extent of involvement is moderate are suitable for either surgery or irradiation but we prefer irradiation. In tumours extending into the joint, it is said that surgery is to be preferred but we see no reason why radiation should not be used; we have had occasion to treat such cases with irradiation with good results. In tumours of the digit of hands and feet surgery is preferred inasmuch as the treatment is finished quicker.

Radiation therapy.—The type of radiation recommended is roentgen therapy. We use only this method. According to BRAILSFORD it offers good results in about 85% of the cases. Complete consolidation is obtained by this method alone. Functional result is better than with surgery. Even in tumours with gross involvement of bone where amputation seems inevitable, radiation therapy has proved of great avail leading to consolidation of the diseased area and saving the loss of limb. The dose required is not very high. We give a tumour dose of 2,000 roentgens delivered in a period of about four weeks. The factors are 200 kv., 0.5 mm. of Cu plus 1.0 mm. of Al filter, 50 cms. F.S.D. 150r at a sitting; treatment is on alternate days. There is no necessity for repetition of the

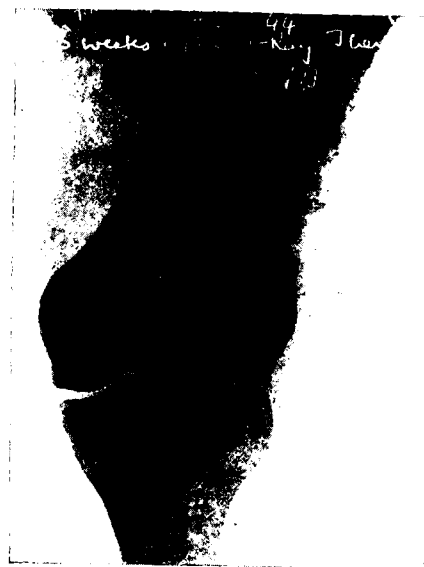
treatment. When high doses are used it takes longer time to calcify; after treatment show this; there is nothing else happens.

Effects of Irradiation in a Case of Osteoclastoma



FIG. 9.—(a) Before Roentgen irradiation.

(c) 6½ weeks after irradiation—consolidation has commenced.



(b) 3 weeks after irradiation—Note increase in size and osteolysis.



(d) 2½ years after complete consolidation. (The patient failed to report between 6½ months and 2 years and so pictures could not be obtained in this period.)

Certain changes which happen under irradiation should be noted. Immediately after the treatment there is an "apparent extension" of the

area commences to consolidate. Recalcification takes place and in a period extending from 8-10 months the consolidation is completed. During

Effects of X-Radiation on Osteoclastoma

FIG. 10.—These pictures show progressive recalcification. The trabeculae which were not seen in the picture before irradiation are well brought out when reactive bone is laid down after irradiation.



(a) Before irradiation.



(b) 4 months after irradiation.



(c) 7½ months after irradiation.

the period when the skiagrams show increased osteolysis, clinically too the tumour appears bigger red and glossy. This is often mistaken as activation of the tumour by those not conversant with radiation therapy and had been the cause of many an amputation. The increased osteolysis seen

Effects of Irradiation in a case of Osteoclastoma of the Mandible

FIG. 11.—There is complete consolidation of tumour with regularisation of the anatomical contours.



(a) Before irradiation.



(b) One year after irradiation.

in osteoclastoma immediately after treatment is not a feature of osteosarcoma; on the other hand after irradiation the latter tumour shows evidences of progressive shrinkage and recalcification. During the period of osteolysis the limb must be immobilised if it is a weight bearing one.

FIG. 12.—Pictures of Osteosarcoma of Scapula treated with X-ray Therapy.



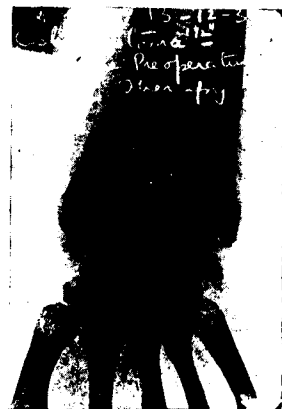
(a) Before X-ray therapy.



(b) After 2,000r

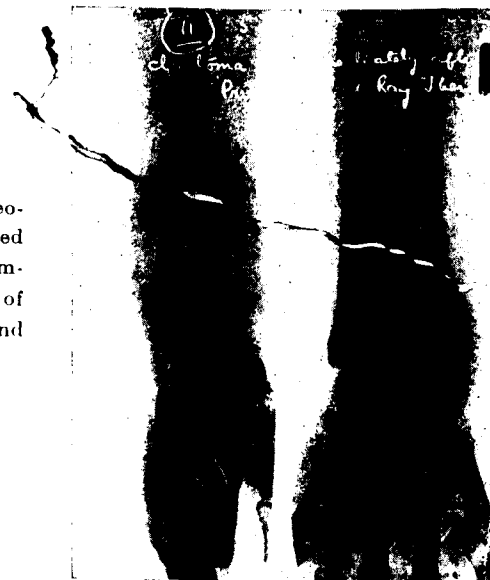


(c) After 5,000r



(a) Before irradiation (pre-operative).

FIG. 13.—Osteoclastoma treated by the old combined method of irradiation and surgery.

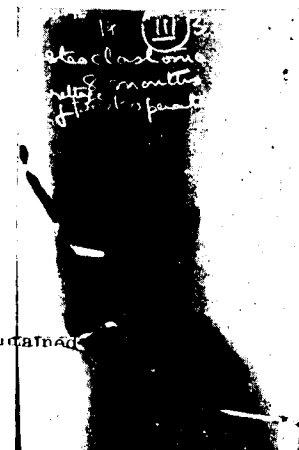


(b) Immediately after irradiation.



(a)

(c) 8 months after curettage and post-operative irradiation.



(c)

There is good consolidation; the condition has not recurred till today—nearly 7 years since treatment. (This method of treatment has since been given up.)

In treatment it is sometimes a matter for decision as to whether a particular tumour is benign and to be treated as such or is malignant and requires to be drastically dealt with. For the experienced radiologist it should not be a matter of difficulty, nevertheless there are cases highly suggestive of malignancy. In these it is advisable to do a biopsy. This does not in any way hamper the chances of successful treatment. The latest method of treatment of bone sarcoma is irradiation followed by amputation. The five year survival figures of New York Memorial Hospital, as quoted by Prof. CADE are as follows:—"with amputation alone 4.5 %; with irradiation followed by

amputation 46 %"; this being the case the best procedure in an osteoclastoma suspected to be undergoing malignancy would be to do a biopsy and knowing its nature follow it up with irradiation if it is benign, or irradiation and amputation if it is malignant. There is no need for a biopsy in an osteoclastoma, the radiological features of which are precise. BRAILSFORD goes to the extent of advising against biopsy in every case. In his view "there is no simple lesion which produces this radiographic appearance which will be improved by biopsy and there is no malignant lesion which will not be the better for radiation, even if amputation appears to be desirable."

INTERESTING CASE REPORTS

X-Ray Diagnosis of Intra-Uterine Hydrocephalus

Dr. M.D. JOSHI, M.B., B.S., F.C.P.S., D.M.R. E., J.P., Bombay.

INTRA-UTERINE hydrocephalic rarity of this condition. When the foetus when suspected, throws foetus head is directed downwards, considerable responsibility on the the diagnosis is fairly easy, but the



Radiologist who reports the diagnosis. More so, on account of the difficulty would be to distinguish from a giant foetus. Richard Torpin

and L. P. HOLMES, in their article in of comparative measurement of a the September 1941 issue of "Radio- normal, hydrocephalic and a giant logy" give the following table foetus.

	Normal 7 lb. 4 oz.	Hydrocephalic 9 lb. 8 oz.	Giant. 14 lb. 7 oz.
Biparietal (B.P.)	9.5 cm.	11.5 cm.	10.75 cm.
Fronto-occipital (F.O.)	12	15	
Suboccipito-bregmatic (S.O.B.)	9.5	12	11
Diameter shoulders	9.5	11.5	16.5
Diameter iliac spines	8	8.5	
Circumference of head	30.5	43	
Crown heel	49	52	62.5
Crown-rump	39	40	

Varicosity of the Oesophagus

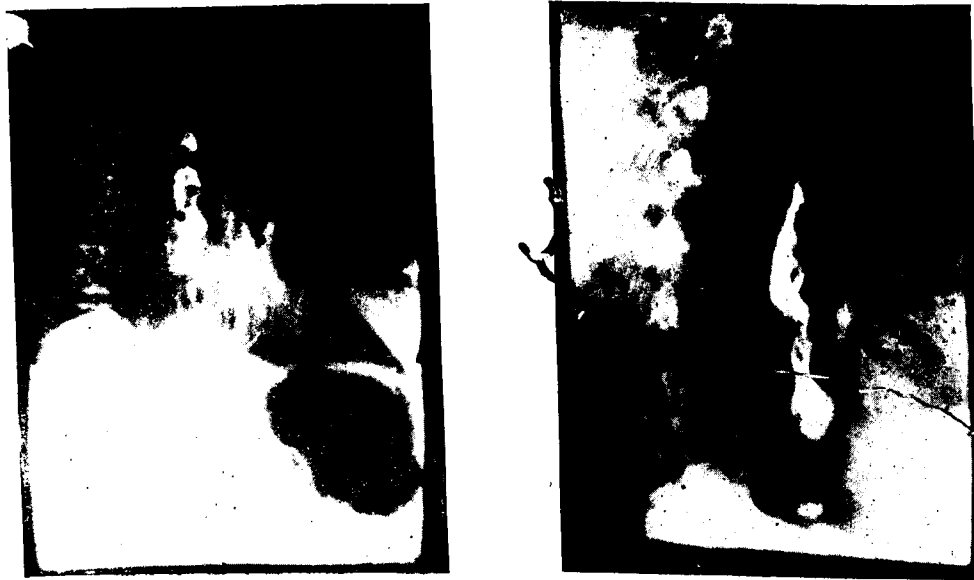
DR. ARTHUR DANIEL, M.B., B.S., D.M.R.
BARNARD INSTITUTE OF RADIOLOGY, MADRAS.

Case I.—Mr. V. a patient aged 52 years complaining of gradual increasing dysphagia and dryness in throat was referred to Dr. T. K. SUNDARAM by D. M. R. GURUSAMY for investigation of oesophagus. Fluroscopy and Radiography were done which showed a characteristic appearance of irregular trabeculation of negative shadows suggestive of varicosity of oesophagus. Though varicosity of oesophagus

is usually limited to the lower part of oesophagus, it may involve almost the entire length of oesophagus and cardia of the stomach. The characteristic appearance will reveal irregular trebeculation of negative shadows and if the veins are numerous it will show beaded appearance too.

The possibility of malignancy could not be excluded though a

biopsy was done. The patient died of broncho-pneumonia. No radiological evidence of secondaries could be found. No autopsy could be done. Similar case was reported in the Year Book of Radiology 1946.



Case 2. Tonsilolith of Left Tonsil.—A man named M. G. about 45 years, fitter by occupation in Cochin harbour gave history of having sore throat every now and then. For the last six months he was having pain in the ear and pricking pain on swallowing. He could feel something hard in the tonsillar bed with his own fingers. The patient was admitted in the E.N.T. Wards in General Hospital



Lateral view.



After removal.

45 years, fitter by occupation E.N.T. Wards in General Hospital

and was referred to the Barnard Institute of Radiology. ing region and skiagram were taken.

Radiographs were taken which showed calcification in the region The tonsils were enucleated and the affected tonsil on dissection



Axial view.

of the tonsil in two pieces. Barium showed a thick capsule and part of tonsils was covering the stones. Barium was applied on the opposite tonsil to show the correspond- which showed faceted appearance.

Case 3—Congenital Anomaly of Sternum. Of the few cases showing anomalies of ossification of sternum, congenital fissured sternum is a rare anomaly. The sternum develops from two cartilaginous plates, one on either side of the mid line. These plates fuse on the mid line in the eighth week of foetal life to form a cartilaginous sternum which is ossified from six or more centres. The manubrium sterni may have two or more centres of ossification. Though the first segment of the body of sternum seldom has more than one centre, the other pieces are often ossified from laterally placed centres. So in these cases the two cartilaginous plates have attempted at partial fusion at the lower ends and are ossified from laterally placed centres of ossification.



Patient 'R' Iyer.—An adult aged about 35 years was referred to

Dr. K. M. RAI, for medical examination for life insurance. He was disqualified on account of Bifid Sternum, through which the pulsations of heart and great vessels were visible and felt. The sternum is U shaped.

Patient 'P'—A patient admitted in General Wards on the Surgical Side in General Hospital for abdominal complaints was referred to the Barnard Institute of Radiology for visible pulsation of heart and great vessels through the sternum. The sternum in this case is completely bifid.



My grateful thanks are due to Dr. T. K. SUNDARAM, Medical Officer, Skiagraphy Section, Barnard Institute of Radiology and Dr. K. M. RAI, Professor of Radiology and Director of Radiology for their encouragement and valuable suggestion and to the Superintendent, General Hospital for allowing me to publish the above Case Reports.

Report of a Case of Osteoclastoma Treated by 400 K.V. X-Ray Therapy

RAO BAHADUR DR. P. RAMA RAU, D.M.B. (Vienna),
DIRECTOR, THE MADRAS RADIOLOGICAL INSTITUTE, KILPAUK, MADRAS.

Miss. S., aged 13, admitted on 8th December 1945, gave a history of pain just below the left knee for which massage was given. Pain and swelling increased with each week duration of symptoms six weeks.

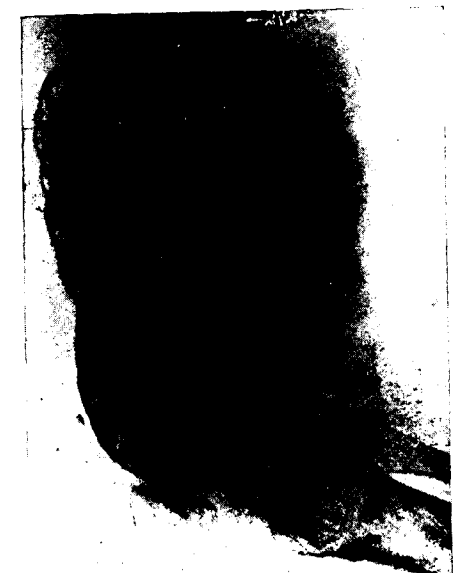
On admission a radiograph taken showed osteoclastic process of the upper end of the metaphysis of the tibia. The involved area of bone was expanded and showed destruction of the shell of the tumour on the outer aspect. There was no clean-cut shell demarcating the tumour from rest of the shaft of the tibia, but there was evidence of infiltration—rarefaction and osteoporosis, extending to the shaft below the tumour (Fig. 1).



1. Before treatment 8-12-1945 radiograph of case under report.

A simple osteoclastoma will have a shell; the bone itself may show

considerable expansion with thinning of the cortex and bony septa dividing the tumour into loculae. There is absolutely no reaction in the shaft of the bone adjacent to the tumour in simple osteoclastomata and the shell is entire, except in rare cases when it bursts into soft tissues. (Fig. 2).



2. Considerable expansion is seen in this osteoclastoma of lower end of femur.

In this case, as there was reaction in the bone below; this was considered to have undergone malignant changes. General health of the girl was satisfactory, lungs showed no

evidence of secondaries. As against amputation, the girl being so young, she was referred to me for deep X-ray therapy by a Madura Surgeon.

Treatment.—400 k.v. 5 mm. Cu+1 Al. filter H.V.L. 4.85 mm. cu. 10×10 cm. two oblique fields total dose of 6,000r in 24 days daily dose being 200 or 300 r according to immediate systemic reactions. Osteo-calcium with Vitamin D, and Hepatex and Berin injections on alternate days to support osteoblastic processes and the haemopoietic system, respectively, was the supplementary treatment.

24-12-1945: As previous experience had shown, separation due to

28-4-1946: X-rayed again after removing the plaster case: recalcification was evident in the tumour and there was considerable thickening of the cortex, the destructive extension in the shaft of the tibia was not apparent (Fig. 3). Skin over field of exposure was good and the plaster cast was put on again.

19-8-1946: Plaster was removed and the radiograph taken showed more consolidation. Patient was asked to walk about on crutches.

27-3-1947: Radiograph taken at Madura showed still greater consolidation (Fig. 4). Patient is reported to be doing well.



3. Radiograph taken on 28-4-'46.

destruction of epiphyseal cartilage is possible in these cases, the limb was immobilised in a Plaster of Paris cast.



4. Radiograph taken on 27-3-1947.

Brailsfords article "diagnosis and treatment of osteoclastoma" in July 1944 issue of Radiology is illuminating.

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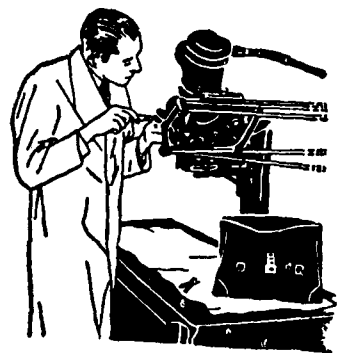
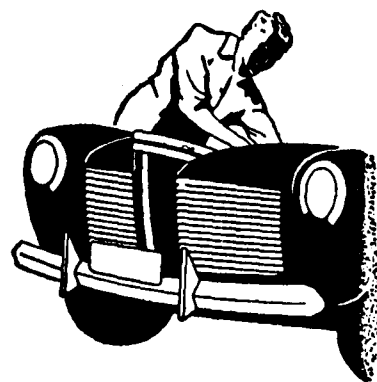
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The Problem of Cancer

IN the history of war against cancer, there have been three distinct phases in the more advanced and socially conscious countries of the west and the western hemisphere. These three phases closely followed the stages in the knowledge of cancer and the methods of attack at the disposal of the people. The first phase extended from ancient times upto about the last quarter of last century; that of ignorant superstition and quiet resignation to fate or "Kismet." People believed that when they were struck by such disease as Cancer—believed to be incurable—it was due to the action and reaction of some past Karma and nothing could save them from the just retribution of their past actions the penalty that has to be paid for transgressing some laws of God or Nature. Under this cloud of thought nothing tangible was done, except founding some charitable chronic hospitals or poor houses.

The second phase started with the practice and development of aseptic surgery. Very great advances in cancer surgery took place during this period and some of the operations devised for the radical removal of the primary growth and its probable paths of extension have not been improved upon even to the present day. This stage can be rightly called the age of radical surgery.

The third stage was reached soon after the famous and epoch making discoveries of Prof. ROENTGEN and the Curies. This dates from the beginning of this century and can be rightly called the period of radiotherapy. During this half century a conscious and continuous attempt has been going on at experimental study of cancer and also an organised campaign against this disease and its early treatment. The state and the more advanced sections of the public have taken upon themselves this as a social duty. In most of the socially

advanced countries, their governments have passed special legislations whereby it has been enacted that Cancer Service is one of the primary social services to be rendered by the State to the citizen. This is one of the many post-war burning questions in Great Britain. But what have we in this country done to combat this dreadful disease which takes such a heavy toll of human life and a great majority of them succumb to this disease at their most fruitful age and at the zenith of their earning capacity? What have we done to lessen this drain on national wealth and economy? Although certain governments and charitable institutions here and there have done very commendable and considerable ameliorative work in this direction it cannot be said that we have touched even the very fringe of this gigantic task. There has been no organised campaign, no determined and sustained attack on the solution of this problem. The very enormity staggers one and, even the most stout hearted simply begin to quail before this task. The masses are steeped in ignorance, illiteracy, superstition so that nothing short of a revolution in their outlook on life will wake them up and stir them to do something to save themselves from the untold miseries and sufferings from this disease. The task may look staggering and almost impossible of solution, but there is the well known

saying "every cloud has a silver lining." Such a silver line was heralded during the First Indian Congress of Radiology which met at Madras during the year 1946. Thanks to the great encouragement given both by the public and the then head of the Medical Department Major-General HUBAN; the Cancer Association of Madras was formed which enlisted the support of both high officials and influential non-officials. The Madras Government are actively associating themselves with the objects of this Association. His Excellency the Governor of Madras has graciously consented to be the Patron of the Association and with the Hon'ble the Minister of Public Health as its President along with the co-operation of several heads of departments as *ex-officio* members the Association is bound to succeed in this laudable purpose.

The objects of the Association are many and the chief among them are started to be as follows:—

(a) The prevention, control, treatment and relief of cancer.

(b) The encouragement of, and the assistance in, the establishment throughout the Province, of Districts and other Associations having objects similar in whole or in part to those of the Association.

(c) The affiliation or control of, and the rendering of assistance (financial or otherwise) to any

Association or institution having objects similar in whole or in part to the Association.

(d) The taking over of the assets and/or activities of any person or body for the advancement of the objects of the Association.

(e) The administration of endowments having for all or any of their objects the prevention, control, treatment and relief of Cancer.

(f) The collection, management and disbursement of funds raised or to be raised for all or any of the objects of the Association etc.

All these new tasks require an organised collaboration of all the forces of society. We should have anti-cancer leagues in every province, every district and every taluq to make it a success.

Our knowledge of the cause of cancer is not sufficient to justify prophylactic measures systematically organised on the part of the society. Therefore the social measures to be undertaken at present with a view to fight cancer should be those which would make available to cancer patients the best available treatment by modern therapeutic measures, *i.e.*, radiotherapy and surgery and that at the earliest possible time in the life history of the primary cancer.

The problem of rendering surgical aid in our country—though not the ideal is far more satisfactory, but

the other problem of rendering radiotherapy is far less satisfactory and more difficult. For one thing—Radium and X-ray equipments are very costly to provide but the greater problem facing us today is the acute shortage of really well trained and experienced radiotherapists. The physician who desires to specialise in Radiotherapy should have a variety of interests and aptitudes to make a successful radiotherapist. He should be a good practical surgeon with some practical knowledge of other specialities in surgery and gynaecology with a good knowledge of radiation physics and an aptitude for radiotherapy. It is hard to find such men to take up radiotherapy owing to the prevailing conditions in the practice of radiotherapy in several of the clinics of this country. Hitherto the radiotherapist did not get that amount of recognition at the hands of his colleagues and employer—be they the government or private employers as his other conferrers in the profession. This problem came up in an acute form in Great Britain and has been happily solved in that country. If radiotherapy should claim the services of really good men, then the invidious distinctions between surgeons, physicians and radiologists should disappear and every one of the team working in a cancer clinic should have equal status and equal opportunities to do full justice to his speciality. Radiotherapy

alone or in conjunction with surgery constitutes the best method of treatment in about 45% of all operable tumours. As the radiotherapeutic work has such special requirements and so extended a domain, it takes up a man's whole time. Radiological knowledge and experience can only be acquired and maintained by practice specially consecrated to radiology. Radiotherapy needs special technical and scientific auxiliaries which are more expensive than any other medical speciality. These circumstances taken together show that radiotherapy must have special clinics at its disposal, directed by physicians knowing this science thoroughly and devoting themselves entirely to it.

The whole problem in the question of organisation would find a satisfactory solution if radiotherapeutic clinics under specially qualified physicians for radiotherapy were created in the larger hospitals on a zonal basis. These should be preferably in the large university hospitals. Prof. REGAUD among many other leading authorities are strongly in favour of such centralization. In being part of such hospitals, the radiotherapeutic clinic has the chance of collaborating with the other medical departments of the college and the hospital to a degree which will be hardly possible in a hospital exclusively built for cancer patients except at tremendous cost. The

organised collaboration with surgery and its specialties is of particular importance for radiotherapy and there is also a certain psychological value in that it may minimise the fear complex of the patient seeking treatment for a tumour in a General Hospital. The word *cancer* invariably strikes a very depressant note even on the enlightened mind.

To begin with it must be confined in any province to one or two pioneer clinics, whose most important task should be that of training radiotherapists and providing experience in the radiotherapy of cancer and its organisation under expert guidance instead of allowing the future radiotherapist to gather experience in a wandering manner. The essential condition in the organisation of an efficient radiotherapeutic centre should be organised teaching of radiotherapy and cancerology both for the under-graduate medical students and the post-graduates. For the complete instructions in the diagnosis and therapy of cancer the organisation suggested above appears to be the best.

One of the most important tasks in the campaigns against cancer is that of encouraging general medical research and of creating organisation necessary for these researches in order to deal with the problems specially connected with cancer.

Another fundamental factor for the efficient treatment of cancer is

well organised medical instruction to the general practitioner and the family doctor in the early diagnosis and treatment of cancer, as well as a very wide and extensive dissemination of popular knowledge about the disease by way of both visual education, through cinemas, written pamphlets, lectures and journals. But the final aims of anti-cancer propaganda is that of winning the confidence of the public, the general medical practitioner, the charitable and philanthropically disposed people

and above all the dispensers of public grants. The best means of propaganda however is to have a large number of people cured of cancer and this living propaganda will very largely and ultimately depend upon the number of well equipped cancer clinics under the management of experienced physicians specially fitted for the different branches of treatment and who will devote themselves entirely to this difficult but fruitful task.

K. M. RAI.

NOTICE TO CONTRIBUTORS

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

Contributions should be typewritten on one side of the paper only. They are accepted on the understanding that they are sent exclusively to this Journal and a statement to that effect should accompany every contribution. Illustrations will be the Copyright of the 'Indian Journal of Radiology' and may not be published elsewhere without permission. Rejected contributions will be returned if accompanied by a stamped addressed envelope.

All communications regarding membership of the Association, subscription to the Journal and advertisements may be addressed to the General Secretary, The Indian Radiological Association, 155-157, Poonamallee High Road, Kilpauk, Madras, 10.

**Annual General Meeting of the Indian Radiological Association
for 1947 and the Second Indian Congress of Radiology,
Bombay.**

25th to 28th December 1947.

TENTATIVE PROGRAMME.

The inaugural Session will be held at 11-15 a.m., on the 25th December 1947. It is proposed to hold the Session either in the Compound of the J. J. Hospital, or at the G. S. Medical College. Dr. JIVARAJ MEHTA, Director General of Health Services in India has kindly consented to inaugurate the Congress.

After Lunch, Central Council meeting will be held followed by Annual General Meeting. Agenda will be announced later.

All the Annual Conferences of the various Medical and Specialists Associations are to be held this year at Bombay—A *Medical Conferences Festival* commencing on 24th December 1947. It is expected that there will be symposiums in the forenoons for all the Medical Conferences; the Special Radiological Sessions will be held in the afternoons from 3 to 6 p.m. on the 26th, 27th and 28th December, 1947. On the 28th afternoon there will be continuation of unfinished items of the annual meeting, followed by meeting of the new Central Council. On the 29th, the programme will consist of visiting hospitals, institutions, entertainments, etc.

The Reception Committee proposes to send further details regarding the above, by post to all members by the 1st week of November, 1947, and in addition, they will be published in the next issue of the *The Indian Journal of Radiology*.

Those who like to read papers are requested to get in touch with Dr. R. F. SETHNA, D.M.R.E., Navasari Building 3rd Floor, Hornby Road, Bombay-1.

P. RAMA RAU,
General Secretary.

To All Members of the I.R.A.

C I R C U L A R

DEAR DOCTOR,

Drawing attention to Rule 56 (a) Quoted below, I am to request you to kindly reply me before the 30th September about your willingness or otherwise to serve on the Central Council or as one of the office bearers for 1948, if elected at the forthcoming Annual General Meeting of the I.R.A. to be held at Bombay during X'mas week this year.

56. (a) "On or before the 15th September of every year the General Secretary shall issue letters to all members eligible for election to the Central Council enquiring whether they are willing, if elected, to act as officers and members of the Central Council. *The replies must reach the Secretary before the 30th September.*"

MADRAS, }
30-8-'47. }

P. RAMA RAU,
General Secretary.

Abstract From Current Literature

Pulmonary Sarcoidosis.—(L. H. Garland, *Radiology*, April 1947 pp. 333-351).

Sarcoidosis is a generalised disease of unknown origin in which characteristic histological changes are found in different organs and tissues. Usually insidious in onset it tends to run a chronic relapsing course. Constitutional symptoms vary; fairly mild in most cases but quite severe and even fatal in a few. Age of incidence is mostly between 20—30 years, but no age is immune. Negroes seem to show a greater susceptibility for this disease, but it can occur in any race.

Although it is generalised, involvement of only one system is often apparent, e.g., lesions of the skin, the eyes or the lungs. Fever, fatigue, slight dyspnoea may be complained of. Peripheral lymphadenopathy occurs in 90% of cases, the nodes are painless, discrete and movable. Pulmonary involvement occurs in a similar percentage. 40% of cases show cutaneous and ocular lesions; skin lesions are in the shape of brownish, sharply defined nodules in the skin or subcutaneous tissue, distributed over the face or extremities; in the eye it is a chronic bilateral granulomatous iritis or iridocyclitis without much redness or pain, which regress spontaneously or progress to complete blindness. Enlargement of liver and spleen is fairly frequent. Cardiac and pericardiac involvement is noted. Bone marrow may be involved and roentgen evidence of such is noted only in a small percentage of cases; the appearances are either multiple radiolucent areas or diffuse lace-like rarefactions; phalanges of the hands and feet are most commonly involved. Salivary glands may be involved. Hyperglobulinæmia with reversal of the albumin-globulin ratio is a common finding. Eosinophilia may

occur. Tuberculin reaction is usually negative. (The conditions with which sarcoidosis is most often confused are tuberculosis and Hodgkin's disease).

Histology:—The essential lesion is a miliary tubercle composed of a central giant cell surrounded by epithelioid cells and lymphocytes, the giant cells sometimes containing an asteroid body. No perituberculous inflammatory reaction, caseous necrosis or calcification occurs, thereby distinguishing the sarcoid tubercle from the tuberculous tubercle. Tubercle bacilli are never found in the uncomplicated sarcoid tubercle. The sarcoid tubercle has a tendency to undergo hyalinisation and fibrosis.

Pulmonary findings:—The author reviews the literature on this subject with particular reference to lung and mediastinum. He reports also his findings in 36 cases of his, 33 of which were verified by histological examination. The thoracic roentgen findings are classified into three groups; apparent involvement of lungs alone, lung and lymph node involvement, and lymphadenopathy alone. The pattern of lung involvement is extremely variable, ranging from true miliary densities through coarse nodulations and apparent linear fibrosis to coalescent cirrhotic or pneumonic shadows all with or without adenopathy. There is absolutely nothing characteristic in the findings in the individual case; however the apparent excellent health of the person in contrast with the extensive roentgen shadows often warrants a surmise as to the nature of the latter. The miliary and nodular lesions are due to aggregations of sarcoids in the lung parenchyma. The linear lesions may be due to sarcoid lymphangitis, to lymphoedema, to congestion or occasionally to fibrotic changes.

A curious pattern of lymphadenopathy called by the author 'sarcoid type' is

said to be of diagnostic value. The pattern consists of simultaneous enlargement of both sets of hilar nodes and only the right upper mediastinal or paratracheal nodes.

The course of a given case is usually quite unpredictable. The lesions may regress, remain stationary or progress without apparent reason. This renders estimation of the beneficial effect of therapy, such as roentgen irradiation, extremely difficult. Some cases progress to diffuse coalescent pulmonary fibrosis with variable degrees of cardiac embarrassment. In some, coincidental tuberculosis develops.

Differential diagnosis:—It is impossible on the basis of roentgen examination alone to differentiate the many lesions, the gross anatomic pattern of which simulate sarcoidosis. The following have to be excluded: (a) miliary pulmonary disease of any type such as tuberculosis, coccidioidomycosis, carcinosis, etc; (b) nodular pulmonary disease of any type such as pneumoconiosis, severe chronic passive congestion, Ayerza's disease, leukaemia, virus or coecal pneumonitis, eosinophilia, broncho-pneumonia, periarteritis, nodosa, byssinosis, schistosomiasis and fungus infections; (c) parenchymal infiltrative or fibrotic disease such as chronic fibroid tuberculosis, lymphoblastoma, roentgen pneumonitis, paragonimiasis etc., and (d) mediastinal and hilar disease as tuberculous adenopathy, lymphoblastoma (Hodgkin's type especially) aneurysmal dilation of the pulmonary arteries, etc. These are excluded on clinical grounds, skin tests, histologic study of a removed node etc. According to the author certain patterns are suggestive of pulmonary sarcoidosis. In the order of frequency they are: (a) bilateral hilar and right paratracheal adenopathy with or without associated pulmonary infiltration or nodular densities, (b) widely disseminated pulmonary miliary or nodular densities without

calcification in a person clinically well; and (c) massive enlarged hilar nodes in an apparently well person.

The presence of associated lesions in the peripheral nodes, skin, uveal tract is obviously of diagnostic value to the alert clinician. A palpable lymph node or skin nodule is the most desirable tissue for microscopic examination. When none such is evident, exploration of the medial end of the right supraclavicular fossa through a short incision will frequently yield an upper anterior mediastinal node for study and positive diagnosis.

S. VENKATESWARLU.

Roentgen Treatment of Infection of Tonsils and Post-pharyngeal Lymphoid Tissues in Children.—A. F. Rossito, *Radiology*, February 1947: pp 118-123.

The author first used Roentgen therapy to pharyngeal tissues, only in cases in which tonsils and adenoids had been removed surgically, and in which symptoms which had led to operation either persisted or recurred after a short period of relief. Having had satisfactory response, in these cases, children with similar symptoms and in whom no tonsillectomy and adenoidectomy was done, were also treated with roentgen therapy. The results in the latter proved equally satisfactory as in the former and were even more spectacular.

The chief complaints in these cases were some of the following:—

- (1) Cough.
- (2) Tonsillitis and sore throat with or without cervical adenitis.
- (3) Gagging and vomiting.
- (4) Mouth breathing with nasal obstruction.
- (5) Ear disturbances—recurrent or persistent draining ears with or without hearing difficulty.
- (6) Asthma.

In all cases there was a history of recurrent colds.

The author uses 4 to 6 roentgen treatments given over a period of 3-6 weeks. The technical factors are 200 k.v.: 0.5 mm. Cu+1.0 mm. Al. filter and 50 cm. target skin distance.

The first treatment consists of 60-70r over each lateral sinus, the pharynx and cervical regions. This covers the adenoids, pharynx, tonsils, and cervical lymph node areas. The second treatment is 5-7 days after: 75r are given as in the first treatment. An additional 10-15r are given to an area centred over the nasopharynx, so that it receives a total of 85-90r. All tissues are screened and protected except the nasopharyngeal area, which is treated with a circular portal of 6 cm in diameter. The third treatment is exactly like the second and is given 7 days later. The fourth treatment is 7-10 days after; dosage is increased so that the entire lateral face and cervical area receive 85-90r, while the nasopharynx is given 95-110r.

The fifth and sixth treatments, if required are given 2-3 weeks later. The maximum dosage is 110r to the nasopharynx and 90r to the cervical and tonsillar area. These two treatments are not usually given and are necessary only in long standing cases.

Where cough predominates chest is treated with each treatment until the cough disappears; 50-60r are given to anterior and posterior hilar fields for the first and second treatments. The dosage later is 125-150r to either anterior or posterior chest.

In asthmatics with infection predominating over allergy chest therapy is repeated at monthly intervals in doses of 100-125r.

About 90% of cases showed cure or an otherwise good results. In all instances there was amelioration of the symptoms for which treatment was sought.

S. VENKATESWARLU.

Biological Significance of Fibrinous Radiomucositis of the Larynx.—Frank Windholz, M. D., *Radiology*, February 1947, pp. 157-160.

It is the belief of radiologists that fibrinous radiomucositis may be considered as a clinical test indicating radiobiological changes in the irradiated tumour. The time of its appearance and extent are used as an indicator for the amount and distribution of radiation in the therapy of tumours of the oropharynx, nasopharynx and larynx. Its appearance is considered to indicate that the dose necessary to destroy tumour cells has been reached. Borak emphasised that if radiomucositis is not induced or only a mild degree there of is provoked by the dose applied, regression of the tumour will be temporary and incomplete. In such cases recurrences may be expected in about a year and permanent cure is the exception.

Windholz made a microscopic study of a number of autopsy specimens of larynges in the stage of fibrinous radiomucositis. He found that the epithelium is gone. The fibrin lies on the old membrana propria. It dips into the ducts of mucous glands. Large amounts of fibrin are present in the subepithelial connective tissues, on the laryngeal muscles and in the perichondrium. In cases in which radiomucositis did not occur only small amounts of fibrin are noted in the connective tissue. With standard technique the variation in the degree of fibrinous exudate formation is due to constitutional differences. Microscopic examination shows that fibrinous exudation is not a reaction of tumour cells; it is a reaction of connective tissues and blood vessels. Development of fibrin membranes always follows necrosis of epithelial cells. The first step is accumulation of fibrin below the epithelium. The defect caused by epithelial necrosis is covered by coagulated fibrin. At the same time subepithelial

connective tissue spaces became saturated by masses of exudate, which again coagulated in the presence of necrotic cell structures. The collagen fibres in such cases exhibit a positive biochemical fibrin reaction. In irradiated patients, radio-necrosis of the epithelium always precedes fibrinous membrane formation. Fibrinous exudation is the mirror of connective tissue response to irradiation. Epithelial cells either normal or cancerous are unable to produce fibrin. Fibrinous membranes located above the tumour tissue arise not from tumour cells but from supporting interstitium between the cells. Clinical relation between fibrinous membrane formation and reaction of tumour to irradiation is based mainly on reaction of the connective tissues and not of epithelial structures. Windholz discussing all these draws certain conclusions regarding formation of radiomucositis in larynx and its significance:

Formation of radiomucositis:—

1. Doses of radiation sufficient to destroy the epithelium always produce fibrinous mucositis, provided there is a constitutional capacity of the connective tissue to produce fibrin in the actual case.

2. Radionecrosis of epithelial tissue may be present in the absence of fibrinous radiomucositis.

3. Strong radiomucositis is not a sign of increased sensitivity of the epithelium or the cancer. It merely indicates increased constitutional ability of laryngeal tissue in a particular case to produce fibrinous exudate.

4. Delay or absence of radiomucositis with standard dosage does not necessarily mean that the cancer is not radiosensitive. It signifies inability or low degree of ability of the connective tissue to produce fibrin.

5. The early appearance of radiomucositis is a sign of early disintegration of the epithelial cells and an early reaction of the connective tissue to radiant energy. Such reaction holds promise that cure will be attained.

6. These relations are the same whether the radiomucositis is localised above the tumour or in more distant areas of oropharynx.

Significance of the radiomucositis:—

1. Connective-vascular tissue participates notably in the complex of reactions connected with tumour retrogression provoked by irradiation.

2. Radiomucositis and its properties are indicative of the degree and extent of connective tissue reaction.

3. The more marked and earlier the connective tissue reaction, the more it contributes to the success of radiation therapy.

4. Delay or absence of connective tissue reaction is associated with a clinically less favourable effect of irradiation.

It appears probable that connective structures displaying strong fibrinous reactions are more likely to be transformed in the course of irradiation into a hyaline, atrophic and fibrosclerotic condition than tissues which do not exhibit this property. The important role of nutritive influences of fibrosclerotic structure in retrogression of epithelial neoplasms is an established fact.

S. VENKATESWARLU.

List of Publications Received*

- "British Journal of Radiology," May, June and July, 1947.
- "International Medical Abstracts and Reviews," July, 1947.
- "Medical Digest," July, 1947.
- "Journal of Venereal Diseases," April and July, 1947.
- "Indian Physician," August, 1947.
- "The Miscellany," July and August, 1947.

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