

but it is most probable that Nature had provided a cure for a vesical stone, which had ulcerated through the bladder base into the rectum. He lived for some weeks following the onset of the "diarrhoea," and died on May 22nd, 1927.

CASE 5.—CARCINOMA OF PELVIC COLON

On November 17th, 1920, Mr. A. T., aged 53, a commercial traveller, came to consult me on the recommendation of his doctor. For five years he had had symptoms of severe cystitis, and recently a bacteriologist had reported that he had found "tubercle bacilli" in the urine. Seven weeks prior to my seeing him the patient had noticed brown flakes in the urine, which had a marked faecal odour. Nothing abnormal could be found on an abdominal examination—that is, there was no area of tenderness, no muscular rigidity, and no abnormal mass to be felt. There was no enlargement of the liver. Nothing abnormal was found on a rectal examination. Cystoscopy disclosed a chronic oedematous ulcer on the bladder fundus, which suggested to me a fistulous communication with the bowel. A good deal of faecal matter was washed out of the bladder during the cystoscopy. In view of the bacteriological report a diagnosis of tuberculous fistula between the intestine and bladder was made, and operation was recommended as the only prospect of giving relief.

Operation, November 27th, 1920.—The abdomen was opened through a median suprapubic incision. A large mass was found in the lower part of the pelvic colon, lying almost transversely across the pelvis, and firmly adherent to the posterior aspect of the fundus of the bladder. On separating the adhesions a fistula was demonstrated between the colon and the bladder. A portion of the colon containing the mass and the fistula was resected, and an end-to-end anastomosis performed by direct suture. A piece of omentum was brought through the gap in the mesentery, and sutured partially around the line of the anastomosis to support it. The fistulous opening in the bladder was closed by infolding separately the muscular and peritoneal coats, using interrupted catgut sutures. A drain was employed, the wound was "bipped," and closed in layers above the site of exit of the drainage tube. There was no other abnormality noted—that is, there were no enlarged abdominal glands, and the liver was normal. An indwelling catheter was tied in per urethram, and left in for ten days. After the operation there was a considerable oozing of blood from the depths of the wound, but one injection of normal horse serum was effective. The patient made a good recovery.

Morbid Anatomy.—The specimen removed at operation (see Special Plate, Fig. 2) consists of a portion of colon divided longitudinally. There is a large ulcerated area, with an irregular base and thickened everted edges, occupying the middle part of the bowel. The lumen of the bowel is almost completely blocked at the upper end of this ulcerated area. The muscle layer of the bowel wall has disappeared opposite the central part of the ulcer, being replaced by new growth. Around this portion of the bowel there is a considerable increase of the subperitoneal fat. A pin demonstrates the site of the fistulous communication with the urinary bladder. Professor Stuart MacDonald, on December 3rd, 1920, reported: "This is a typical columnar-cell cancer."

After-history.—The patient is now alive and well, over twelve years after the operation. Ever since the operation he has continued to carry on his full work as a commercial traveller. I am informed that he is in perfect health, and that he has no abnormal symptoms. His bowels are regular, there is no abnormality with micturition, and his urine is quite clear. The case is of considerable interest bacteriologically, for there can be little doubt that the patient did not have urinary tuberculosis, nor had he ever had it. It demonstrates well the fallacy of relying upon the microscopical diagnosis of urinary tuberculosis. Had a guinea-pig inoculation test been done the error of the microscopical diagnosis would have been established.

CASE 6.—CARCINOMA OF RECTUM

In August, 1921, Mr. J. C., aged 65, came to consult me, complaining of passing blood and slime in his motions. On a rectal examination a malignant ulcer was found on the anterior wall of the rectum in the region of the bladder base.

It proved impossible to ascertain definitely whether the growth was fixed or not. In November, 1921, Professor Rutherford Morison opened his abdomen, and found a fixed inoperable growth of the upper part of the rectum. The abdomen was closed, nothing being done. The course of the malignant disease progressed slowly, and the patient was comparatively comfortable until October, 1922, when he suddenly began to pass flatus and faeces per urethram. His plight became a terrible one, for when every few minutes he tried to micturate, columns of soft faecal matter were voided per urethram. A colostomy was done, which gave some degree of relief, but death did not take place until three months later.

SUMMARY

Intestino-vesical fistula is uncommon. A chronic inflammatory source is probably the commonest cause.

Cases due to colon sacculitis and colon cancer—both successfully operated upon—are described in detail.

Rectal cancer rarely ulcerates into the bladder; one such case is referred to.

In two cases a vesical calculus probably ulcerated through into the rectum.

In the remaining case a tuberculous loop of small intestine was the cause.

X-RAY TREATMENT OF MALIGNANT DISEASE OF THE LUNG

BY

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(With Special Plate)

Within recent years pulmonary tumours have received considerable attention, owing mainly to the increase in their occurrence. There now exists a profuse literature on the subject, but one preponderatingly concerned with diagnosis. On the treatment of the condition very little has been written.

In order to assess the value of a particular form of treatment in a relatively rare condition two methods are open. These may be called the statistical and the personal. In the statistical method an analysis of cases is made from the records of patients, many, if not most, of whom were never seen in their lifetime by the compilers. The one advantage of this method is that only in this way can the results in a large number of cases be seen at a glance, since it falls to the lot of a very few observers to see in their own practice a sufficient number of cases from which to make reliable statistical deductions. This method has, on the other hand, several serious limitations. First, however accurately the records may have been kept, the compilers must lose much from having had no personal contact with the patients themselves. In particular the compilers tend to concentrate upon a comparison of the survival period in the treated and untreated cases. They lose sight of the effect of the treatment upon the patients during their survival, an aspect of the problem which, from a humanitarian point of view, is just as important as the possible prolongation of life. Secondly, if, as usually happens, the compilers are unfamiliar with the technique of the treatment, they are not in a position to assess the relative value of different modifications of technique or to distinguish between adequate and inadequate treatment. Thirdly, there is in this method nothing to prevent the same cases from being analysed over and over again by different compilers. This is an inevitable result of what may be called third-party investigation. It is quite clear that no advance can be made by the repeated publication of the same cases.

EXPERIENCE OF OTHER WORKERS

On the subject of x -ray therapy in intrathoracic tumours there have recently appeared two papers of this kind which well illustrate the points I have made above. The first of these is by Chandler and Potter,¹ who have collected 120 cases from the records of St. Bartholomew's, Charing Cross, and other London hospitals, and from their own private patients. Of these, fifty-nine had received x -ray treatment, while sixty-one were untreated. The writers find the average duration of life to be six months for the untreated and eleven months for the treated. They then go on to say that these figures are probably fallacious, since among the untreated there were several rapid cases, and among the treated several of a chronic type. In thus explaining away the marked difference between the treated and the untreated they seem to me not only to be reluctant to give due credit to the treatment, but also to fail to acknowledge the true significance of their statistics. Let us suppose, for the sake of argument, that the cases numbered sixty treated and sixty untreated. If thirty of those untreated had an average survival of eight and a half months (the mean between six and eleven), the remaining thirty would need to have an average survival of only three and a half months in order to lower the survival of the whole to six months. Similarly, if, of the sixty treated cases, thirty had an average survival of eight and a half months, the remaining thirty (the chronic type) would need to have an average survival of thirteen and a half months in order to raise the survival of the sixty treated to eleven months. It is, however, unimaginable that the proportion of acute cases among the untreated and of chronic cases among the treated could have been as high as one-half. It was almost certainly much smaller. Let us suppose that forty-five in the one class were strictly comparable with forty-five in the other, leaving fifteen to pull down the average survival in the untreated, and fifteen to pull it up in the treated. Simple calculation shows that these fifteen of the treated would require to have an average survival of eighteen months, while the fifteen of the untreated would require to have an average survival of *minus six weeks*. Such is the logical outcome of the contention advanced by Chandler and Potter. The other paper, which is written on the same lines, is by Maxwell and Nicholson.² A similarly adverse view of the effect of x -ray therapy is reached, despite the fact that out of one hundred "selected" cases the average duration of life was fourteen months in the treated and 10.9 months in the untreated. "Our results," they write, "are not encouraging." In four, life may have been prolonged; in three there was rapid dissemination. To my mind the results arrived at by Maxwell and Nicholson must be largely discounted, partly because some of the cases were evidently identical with those of Chandler and Potter, and partly because some of the cases occurred as long ago as 1912, when x -ray therapy was in its infancy. Maxwell and Nicholson further state that " x -ray treatment may also be of use in differentiating certain kinds of growth. Failure to react to heavy doses of x rays by shrinking in size is strong evidence that the growth is a carcinoma." The cases which I shall describe completely refute this statement.

The adverse views quoted above are not shared by those who have confined their observations to their own cases. Herzberg³ states that x -ray therapy causes a temporary diminution in the size of the tumour and its metastases, and affords relief to the stenosis and dyspnoea. Paterson,⁴ analysing nineteen cases, asserts that the treatment results in marked immediate palliation, easing of pain and of coughing, slower accumulation of fluid, and general clinical improvement. Although the average survival is practically the same in the treated and un-

treated (about three and a half months), in the former death occurs more rapidly. He concludes that the relief of pain and the more merciful type of death justifies the treatment, even if life is not prolonged. Davidson⁵ has no doubt that x -ray therapy "does possess a very definite value in treatment, although it must be made perfectly clear that the benefit is only temporary and that x rays must be classed among palliative remedies." He quotes the case of a boy in whom "the relief of dyspnoea, which was extremely distressing both to the patient and to outsiders, was little short of dramatic." The tumour diminished in size, but the boy subsequently developed a very grave anaemia, which seems to have been the immediate cause of death, as the urgent pressure symptoms did not recur. Holfelder,⁶ writing of bronchial carcinoma, states that while the marked tendency to form metastatic deposits hinders complete cure, intensive x -radiation at least improves the condition temporarily, the results being visible radiologically as a diminution in the size of the tumour and the expansion of collapsed parts of the lung. It is the only method by which the severe pain and coughing can be relieved and life prolonged. The longest survival in his experience is three years.

TECHNIQUE

The following nine cases have come under my care in the last five years. For Cases 1 to 6 the plant used was a double coil, giving a potential of 180 kV: filter, 0.5 mm. Cu + 1 mm. Al; focus skin distance, 23 cm.; applicator circular—diameter, 8 cm. Cases 7 to 9 were treated with a condenser plant giving a constant potential of 200 kV: filter 1 mm. Cu + 1 mm. Al; focus skin distance, 30 cm.; applicator rectangular—8 × 10 cm. These conditions gave at 10 cm. depth of water about 30 per cent. of the skin dose. Treatment was given weekly or bi-weekly, one, two, or sometimes three fields at each sitting; the dose to each field being 75–80 per cent. of the erythema dose. The fields were selected according to the position and extent of the tumour as revealed by x -ray examination, and were varied so as to produce so far as possible an even irradiation over the whole of the skin field. Such intensive treatment produced, in due course, a deep and fairly uniform bronzing of the skin. The amount of irradiation was in fact only limited by the tolerance of the skin, for since these are not cases which can be cured the danger of late after-effects to the skin does not arise. With the exception of the ninth, whose condition was already very advanced, none of my patients have suffered any ill effects from treatment. I am convinced that cases such as these cannot be treated on a pre-conceived idea of a "carcinoma dose." Irradiation must be carried out up to saturation point. Every month, or in some cases twice a month, films were taken under standard conditions and the tumour measured.

CASE 1

May 3rd, 1932.—J. G., aged 16, gipsy fair boy, caught cold, had an irritating cough, but continued to work.

May 23rd.—Dyspnoea. Could not sleep. Had to sit up in bed with his head thrown back.

May 26th.—Had to struggle to get his breath. Admitted to Addenbrooke's Hospital under Dr. Gaskell. There was a well-marked swelling of the upper part of the right chest, most prominent just lateral to the manubrium. Not tender. Trachea displaced to the left. X -ray examination showed a large shadow of uniform density with a rounded lower border occupying almost the whole of the right lung field. X -ray treatment was given immediately on admission. The next day the patient was very dyspnoeic. Had a restless night. Continuous oxygen given by catheter. X -ray treatment as above. The day after there was copious secretion from mouth. Restless at night. On May 29th there was surprising improvement of dyspnoea. Looked much better. Very much better the following day. Treatment continued approximately every third day until June 28th.

July 2nd.—Discharged, perfectly fit. Continued treatment as an out-patient until July 27th. Remained in excellent health. X -ray examination showed some diminution in size

of tumour. The boy disappeared, together with the gipsy band to which he belonged. Since then nothing has been heard of him.

This case illustrates the dramatic effect of treatment upon a large tumour, which had reduced the patient to the point of death.

CASE 2

February 23rd, 1928.—R. M., postman, aged 23, was admitted under Dr. Haynes. Had been in low health for three months. Cough for two weeks. On the previous day had had a pain in the left side followed by spitting of blood. Coughed blood again three days later.

March 22nd.—X-ray examination showed a carcinoma of left lung, with some collapse of upper lobe. Tuberculosis right apex.

March 26th and 27th.—X-ray treatment was given. He was discharged from hospital on April 2nd in good health.

April 6th and 12th.—X-ray treatment continued. X-ray examination showed considerable recession of the tumour and re-expansion of the lung. The patient then went away for three months' holiday, which he thoroughly enjoyed.

July 7th.—X-ray examination indicated a slight recurrence. General health good. X-ray treatment. At this stage the patient was persuaded by a friend that he had been wrongly diagnosed and should seek another opinion outside Cambridge, with the result that his trouble was declared to be tuberculosis. This was partly correct, in that he undoubtedly had some small foci at the right apex. He was sent away for open-air treatment.

November 24th.—Readmitted to Addenbrooke's Hospital. X-ray examination demonstrated a dense shadow occupying the whole of the left lung field. The patient died on December 9th, twelve months after onset of symptoms.

Necropsy

Post-mortem examination by Dr. Gaskell revealed a dense white growth extending outwards in all directions from the main left bronchus, reaching the bifurcation of the trachea and spreading into the uppermost part of the right bronchus. Left bronchus very constricted but not occluded. Practically the whole of the left upper lobe and also the upper part of the left lower lobe were involved. Microscopical examination of tumour: a small round-celled variety of primary carcinoma. There was extensive tuberculosis, both old and recent, at the right apex.

This, then, was a case of carcinoma in which x-ray treatment, although administered only for a short period, produced striking recession of the growth and complete restoration to health for several months. It may reasonably be presumed that the patient would have lived longer had he not fallen a victim to faulty diagnosis.

CASE 3

May 21st, 1930.—R. T., a publican, aged 55. X-ray examination showed a carcinoma of right upper lobe.

June 9th.—Admitted under Dr. Gaskell with a history of a lump in right side of neck, and progressive weakness for two months. Lost 1½ stone. No dyspnoea, cough, or palpitation. On examination dilated vessels were seen over chest, and a hard craggy mass on right side of neck. Laryngoscopic examination (Mr. Walford) revealed a right abductor paralysis.

June 13th.—X-ray treatment begun. He was discharged eleven days later, continuing treatment as an out-patient.

August 7th.—Mass in neck no longer palpable. Feels better. Appetite good. No pain.

September 23rd.—Readmitted on account of increased weakness. X-ray examination showed slight increase in size of tumour. Treatment continued. A fortnight later the tumour was smaller, and a month later he weighed 11 st. 7 lb. Discharged. Treatment continued.

November 2nd.—Tumour only very slightly larger than on first admission.

November 11th.—Increased opacity of right upper lobe. He weighs 12 st. 5 lb. Has coughed blood.

December 4th.—Feels very much better. Good appetite. Very little cough.

February 14th, 1931.—Readmitted, having developed a severe headache.

March 23rd.—Great enlargement of mediastinal shadow.

April 11th.—Condition fair to moderate until the last two to three days, when he had an attack of intense cyanosis and dyspnoea, and died.

Necropsy

Post-mortem examination by Dr. Whittle showed a large tumour surrounding root of right main bronchus. Upper and middle lobes infiltrated and riddled with small nodules of growth. Right pleura contains a large amount of blood-stained fluid. In the left lung there were three secondary nodules under the pleura. The pericardium was completely adherent. The liver was very extensively studded with umbilicated secondary growths. The right suprarenal consists of a mass of secondary growths completely replacing gland. Dura mater: a large spherical tumour, two inches in diameter, projecting into left occipital lobe. Microscopical examination: carcinoma.

This was a patient with carcinoma, surviving twelve months after the first symptoms and ten months after the initiation of x-ray treatment, which caused complete disappearance of the glands in the neck, and also effectively checked the primary growth for a period of five and a half months. He remained free from pain and comparatively free from discomfort until two months before his death, when the secondary in the brain began to cause symptoms.

CASE 4

February 2nd, 1931.—H. S., a caretaker, aged 45, was admitted under Dr. Haynes with a ten weeks' history of cough, shortness of breath, and loss of weight. Had coughed a streak of blood on two occasions. Hard masses on right side of neck.

February 4th.—X-ray examination showed an advanced tumour of right lung with partial collapse. Right diaphragm almost immobile. The following day x-ray treatment was begun. Condition steadily improved, and glands in neck diminished and eventually disappeared. He was discharged after seventeen days to continue treatment as an out-patient.

March 10th.—Readmitted on account of fainting attack. X-ray examination a fortnight later showed great dilatation of the pericardium and a left pleural effusion. Tumour greatly diminished, and right lung only slightly collapsed. Treatment continued.

June 16th.—Tumour considerably diminished and lung re-expanded. Pericardial enlargement subsided, but left pleural effusion slightly increased. Sixteen days later: "Feeling fine" except for slight "wheeziness."

August 10th.—Readmitted owing to increasing dyspnoea. No glands palpable in neck. Three days later he had a sudden attack of dyspnoea and died. Survival after first symptoms, nine months; after initiation of x-ray treatment, six and a half months.

Necropsy

Post-mortem examination by Dr. Whittle revealed a mass of growth in the anterior mediastinum, invading the sternum and extending into the posterior mediastinum and involving the roots of the lungs—the right more than the left—and the pericardium. Left lung collapsed. Right pleural cavity completely obliterated by adhesions, and base of right lung firmly adherent to diaphragm and liver. Growth in chest, which is firm and white, extends upwards about one inch above the clavicles. Left bronchus invaded and partly obliterated. Nodules of growth in both peripheral pleurae, but bulk of lung substance not involved. Left suprarenal contains two secondaries, one large enough to involve most of cortex. Microscopical examination: typical oat-shaped cell tumour with much fibrosis.

In this case irradiation caused complete disappearance of the secondary glands in the neck, recession of the primary tumour for a long period, and expansion of the collapsed lung. The effect upon the patient was remarkable. Except for the short period when the pericardium was affected he suffered very little discomfort, and remained buoyant and optimistic until shortly before death.

CASE 5

March 28th, 1931.—E. S., a laboratory assistant, aged 52, was examined by Dr. Haynes. He gave a short history

of swelling of the left side of the neck with pain and shortness of breath. There was a big rocky mass on the left side of the neck. X-ray examination revealed a large tumour of the left lung, and displacement of the trachea to the right.

April 10th.—Tumour increased in size and left upper lobe collapsed (see Special Plate). X-ray treatment was begun on April 13th and continued for two months. His general health improved markedly and the mass in the neck completely disappeared.

June 3rd.—A very striking diminution in the size of the tumour; expansion of the left upper lobe (see Special Plate). He died about three weeks later. No post-mortem. Survival from onset of symptoms, three months.

This was a rapidly growing tumour. The suppression of the cervical mass not only gave considerable relief but had a special psychological value in this case since the patient had an extensive knowledge of pathology. More important, however, is the fact that the patient was able to follow his occupation, travelling to and fro by motor cycle until within two weeks of death.

CASE 6

September 9th, 1930.—T. H., a carman, aged 56, was admitted under Dr. Haynes. Two months' history of cough, getting steadily worse. Occasional traces of blood in sputum. Five weeks previously had a fit—shouting and unconscious—followed by severe pain beneath right nipple, shortness of breath, and palpitation. Lost 1 st. in weight. On examination he was found to have signs of consolidation of the right upper lobe. X-ray examination showed a large tumour of the right lung and collapse of the upper lobe.

October 7th.—Discharged from hospital. X-ray treatment given weekly in the out-patient department for a month. The patient then developed a right-sided hemiplegia and signs of secondary growth in the left buttock, and it was considered inadvisable to move him from his home. He survived, however, until the end of March, 1931—that is, eight months after the onset of symptoms.

Owing to the early appearance of blood-borne metastases affecting the brain and left leg, only a limited amount of irradiation could be given. It is therefore impossible to assess the effect of treatment, but the fact that the patient, with so large a tumour, survived five and a half months after irradiation is not without significance.

CASE 7

December 5th, 1932.—A. L., a tobacconist, aged 52, complained of having had a husky voice for the last six months. Was getting easily tired, short of breath, but was still at work. Mr. Walford found complete paralysis of the left recurrent laryngeal. X-ray examination showed a dense shadow to the left of the aorta, the extent of which was masked by collapse of the left upper lobe. Trachea deflected to left. Left diaphragm immobile. Injection of lipiodol by Mr. Walford, the patient lying on his left side, revealed dilatation of the left main bronchus and obstruction of its upper branch.

January 30th, 1933.—X-ray treatment begun. He improved steadily. Was less easily tired and less short of breath. Condition of larynx unchanged. Two months later, "feeling well."

April 10th.—Slight extension of tumour. Six days later he developed pneumonia while at home and died in two days. Survival from onset of symptoms, ten months.

Apart from a short stay in hospital for investigation the patient was not laid up until two days before death. He was comparatively free from discomfort throughout his illness.

CASE 8

January 18th, 1933.—H. T., a carter, aged 57, was seen by Dr. Cole. Complained of pain in the left side of the chest for two weeks, and hoarseness for three weeks. Enlarged glands in left supraclavicular triangle and left axilla. Left vocal cord paralysed. X-ray examination revealed a tumour of left lung and collapse of upper lobe.

February 23rd.—X-ray treatment begun. Steadily improved in health; felt stronger and was able to garden.

March 13th.—Tumour greatly diminished. Left upper lobe re-expanded. Cervical glands considerably diminished. (Still under treatment.)

CASE 9

April 1st, 1933.—G. D., a roadman, aged 46, was admitted under Dr. Whittle. Influenza eight weeks before, followed by shortness of breath and weakness; two weeks' swelling of neck, three weeks' hoarseness. Hard glands in right side of neck and right axilla. Purulent expectoration, pyrexia. X-ray examination showed a dense shadow occupying the lower and inner part of the right lung field.

April 12th.—X-ray treatment begun. The patient made no response, and tolerated treatment very badly. He was very ill, developed oedema of the right arm, and signs of compression of the right cervical sympathetic. He died about five weeks later, after suffering prolonged agony.

Necropsy

Post-mortem examination by Dr. Gaskell revealed a soft growth of the trachea just above the bronchi. Right bronchus was heavily involved, left bronchus free. Right lung was heavily impregnated with a white, caseous-looking growth, which extended throughout its substance along the paths of the bronchi. It was much shrunken, and a section showed a septic bronchopneumonia with greenish muco-pus. Right pleura contained a large quantity of blood-stained fluid. Left lung was completely free from growth. Secondary glands filled anterior mediastinum and extended up into right side of neck. Heart muscle was flabby and soft, and studded with some secondary deposit from the growth in the lung. Liver was greatly enlarged, and studded throughout with whitish secondary deposits. Secondary deposits also in abdominal glands.

Microscopical Report.—Primary carcinoma of lung, oat-cell type, characteristically spreading along the bronchi and undergoing extensive necrosis with very great distortion and alteration of individual cells.

The advanced state of dissemination, particularly in the liver, and the septic condition of the lung, adequately explained the failure to respond to treatment. The disease must have been widely disseminated before treatment was begun.

DISCUSSION

Case 9 is clearly in a class apart from the others, and to all intents may be considered as untreated. The slow decline of this patient in great pain may be taken as the typical end of such cases. In the others irradiation produced certain very definite effects. The enlargement of the cervical glands disappeared permanently. This alone was no mean gain, since the patients naturally believed that the cervical swelling was the cause of their trouble, and rejoiced at its disappearance. In five of the cases the primary tumour underwent striking recession, and the collapsed part of the lung re-expanded. In two cases irradiation, though it did not diminish the tumour, at least appeared to have inhibited its growth for a time. The survival periods in those that have died were twelve, twelve, eight and a half, three, eight, and ten months from the onset of symptoms, giving an average of nine months, or ten months if we exclude the one rapid case. The average survival after the initiation of treatment was six months. That life was prolonged cannot be proved, but it may reasonably be inferred from the improvement in the physical condition. The mere prolongation of life, however, is a small point. What matters is the condition of the patient during survival. If irradiation only prolonged the agony for a few months its application would not be justified. But the effect in all the cases which have been fully treated has been quite otherwise. The symptoms directly due to the primary tumour and its cervical extension have in a great measure disappeared, and the patients have been restored to a high degree of health and comfort which has lasted until shortly before death. The end has usually been due to embolic dissemination, to which this type of tumour is, from its position, peculiarly liable, and which irradiation has at present no power to prevent.

CONCLUSIONS

In malignant disease of the lung, x -ray treatment, if carried out intensively, causes temporary recession of the primary tumour, re-expansion of collapsed lung, and disappearance of enlarged cervical glands. Whether it prolongs life or not, it certainly provides a survival period of a comparatively high degree of comfort and happiness, the inevitable end being rapid instead of a prolonged agony.

[Space does not permit reproduction of radiograms of the other cases referred to in this article.]

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FRACTURES OF BOTH BONES OF THE LEG

BY

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(With Special Plate)

On account of increasing numbers of road and industrial accidents it has become more necessary than ever, both to the individual and to the community, that fractures should receive immediate and correct treatment; this applies, in particular, to fractures of the lower extremity, because of the important part the limb plays in weight-bearing and locomotion.

I think it will be agreed, at the outset, that the aim of treatment should be the restoration of complete function to the injured limb. One school of thought, however, lays down the axiom that a complete restoration of function is not possible without an anatomical reposition of the injured bone or bones, and urges that this should be obtained irrespective of how drastic the necessary procedure may be. I have doubted the truth of this view for some time, mainly on the grounds that anatomical reduction is of little value without union, and that union is progressively prejudiced as the method of reduction involves more interference. The Liverpool school has always taught that the essential factors in treatment are a restoration of normal alignment to the long axes of the bone fragments, as correct function depends on this, and of full length of the limb. End-to-end apposition, while an admirable ideal in itself, is of secondary consideration compared with alignment, if restoration of function is uppermost in the surgeon's mind; in many cases it ensues automatically upon reduction, particularly if the case is dealt with early, but those methods designed exclusively to produce it often inflict further, and in my opinion unnecessary, trauma on the limb.

It was with the object of proving my contentions on this subject that forty-eight cases of fracture of both bones of the leg have been collected and reviewed. Only those dealt with personally from start to finish have been chosen, and the aim of treatment has been as outlined above.

ROUTINE METHOD OF REDUCTION

While the reduction of each fracture must be considered as a separate problem, the broad principles can be laid down in a fairly standardized form. I do not

presume to make any claim for originality, and there must be many variations quite as good as the method to be described.

(a) *Simple Fractures*.— X rays in two planes should be carefully studied, and a plan of reduction worked out beforehand. The patient is then anaesthetized and placed on a table, with his knees flexed over the end and legs hanging down. The surgeon sits on a low stool, on a level with the patient's foot, and, gripping the malleoli firmly with both hands, first of all applies steady and increasing traction to the leg. This is continued until the length of the injured limb coincides with that of the normal limb, on measurement from the adductor tubercle to the internal malleolus. Shortening, in the early stages, is due to muscle spasm, and this is entirely abolished by anaesthesia and traction, so that there is no fear of shortening recurring when traction is relinquished. This leaves the surgeon's hands free for the next step, which consists in manipulating the fragments according to the plan previously worked out. The patient's forefoot is then placed on the surgeon's knee, keeping the ankle at right angles, and a plaster is applied, over wool, as far as the knee. When this has set, the limb is slowly extended at the knee, and the plaster continued to the groin. Muscle spasm gradually merges into actual shortening, which is more difficult to overcome. Herein lies a strong indication for the early reduction of these fractures.

(b) *Compound Fractures*.—Anti-tetanic and anti-gangrene serums should be administered as routine in road accidents. After a complete toilet of the limb has been carried out, preferably in the operating theatre, the wound is carefully excised under full aseptic precautions. If the case is seen within twelve hours of the accident primary suture is often successful. Later than this the wound is left as a crater, after excision, and covered with sterile vaseline gauze over which plaster can be applied. Reduction is then carried out on the lines already described. By splitting the plaster longitudinally while damp provision is made for the easy inspection of the wound, should this become necessary. Additional x rays are taken to check the reduction. Further manipulation is undertaken if the long axes of the fragments are not parallel, but if this condition is fulfilled strenuous efforts to obtain complete apposition are unnecessary and harmful. Sufficient apposition is usually obtained, and I have the impression, although without sufficient data to prove it at present, that fractures with some degree of lateral displacement unite more quickly and firmly than those in which there is an anatomical reduction of the parts. A more closely fitting plaster, over stockinette, is applied at approximately the end of the first ten days. The limb shrinks, and, unless the replastering is carefully carried out at this time, x rays show that the fragments may drop out of line. At the end of about three weeks the majority of patients walk comfortably in this plaster if a pad of rubber is incorporated in the heel. In the case of oblique fractures ambulatory treatment is not started until the end of about six weeks. At some time after eight weeks I have found it safe to apply a short plaster, from the knee, and active exercises for this joint are instituted, but this must be decided upon x -ray evidence of union as seen in the series of films taken at fortnightly intervals. As will be noticed from my results a majority of my cases have shown firm union at the end of three months. When this has been obtained the plaster is discarded, and active exercises are continued until the muscles of the limb have regained their normal size and tone; at the same time, the patient is re-educated with regard to walking. Allowing for the two or three weeks "convalescent treatment," which is usually obtained nowadays, I think that most men should be ready for their normal work six months after the accident.

R. J. WILLAN: INTESTINO-VESICAL FISTULA

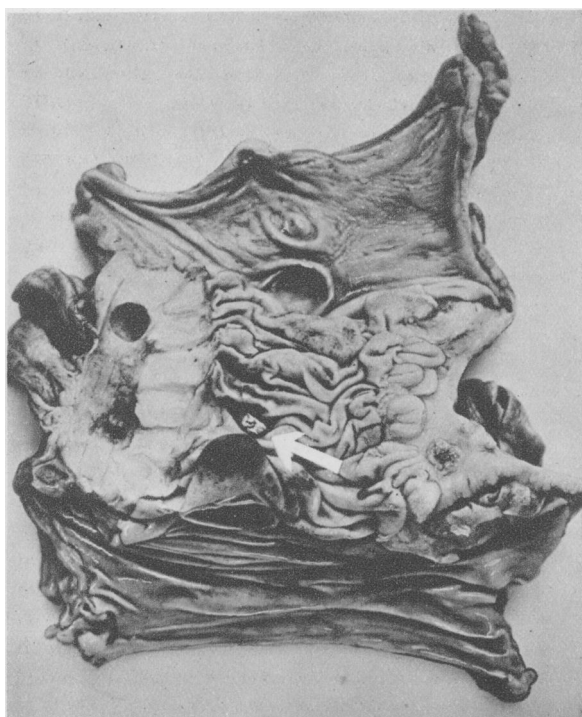


FIG. 1.—Case 2. Resected colon showing thickened area in wall with two well-marked diverticula surrounded by inflammatory fibrosis. The arrow indicates site of diverticulum leading to fistula.

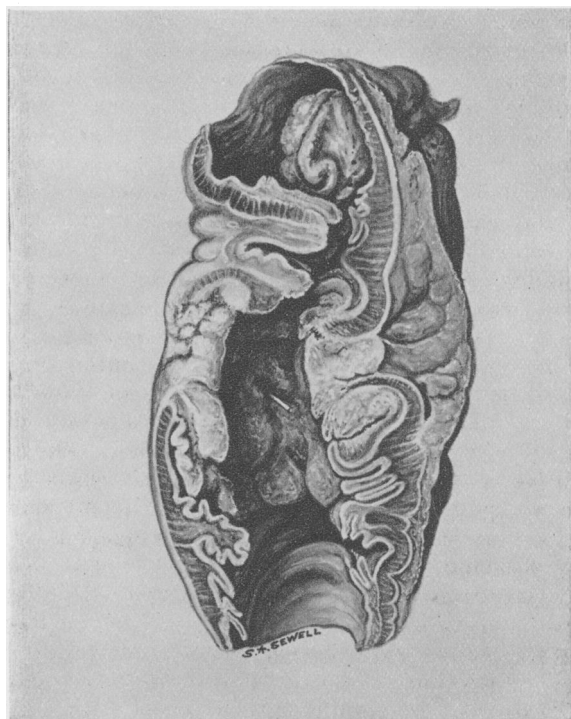


FIG. 2.—Case 5. Colon divided longitudinally. Large ulcerated area of growth is seen almost blocking the lumen. A pin shows the site of the fistula

F. ROBERTS: X-RAY TREATMENT OF MALIGNANT DISEASE OF THE LUNG

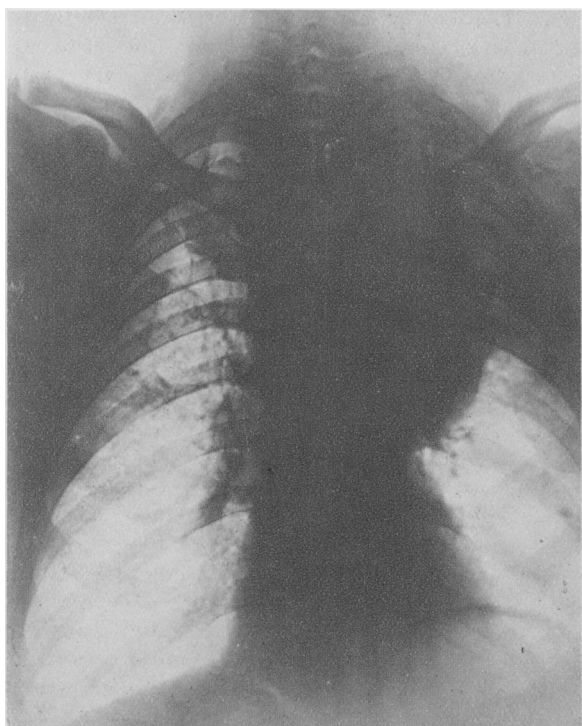


FIG. 1.—Case 5, E. S. April 10th, 1931. Tumour of left lung. Collapse of left upper lobe.

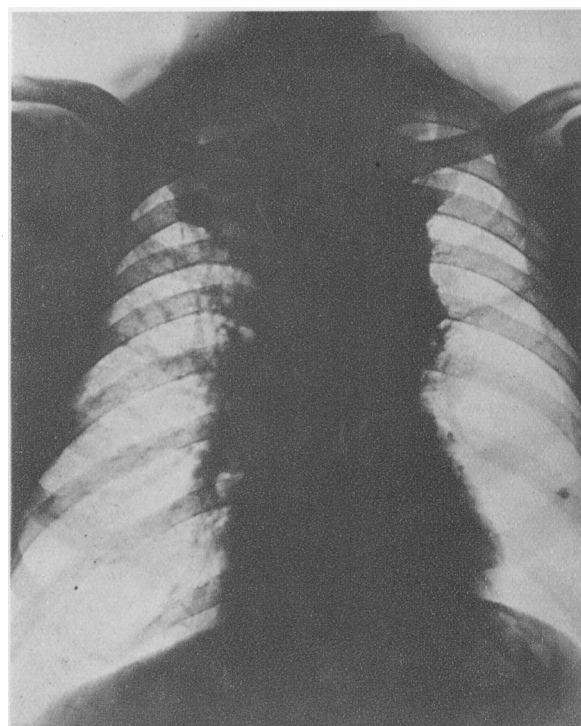


FIG. 2.—Case 5. June 3rd, 1931. Tumour greatly diminished. Left upper lobe re-expanded.