dignity of his art is commensurate with the dignity of the being who is the object of his care. There are essentials necessary to carry out the work beyond a high sense of duty and the conviction; and these are nowadays to be obtained in almost every district, and, as the State has taken over the responsibility of the treatment of such a large proportion of the population, it should be its care to see that every area is able to command them. They are (1) the reciprocal co-operation of a second medical man, and (2) the assistance of a skilful nurse. The able and skilful services of Dr. Alfred Adams and Miss Clarke, Queen's nurse, have in this district been ever ready to command in these surgical emergencies.

It is not within the scope of this theme to detail the surgical procedure to be followed; it is to try to establish confidence in those who may find themselves face to face with surgical emergencies in country practice that the cases and experiences here given of samples of work done in this district in the last few years are now related. It is not wished to give an impression that no disappointments or failures have been encountered. Those cases that are indelibly impressed on the mind are the few that, owing to inability to make an early diagnosis, have been subjected to delay—a fatal error.

Goitre.

A summons came in the middle of the night to see a middle-aged woman who had returned that day from a large provincial hospital as nothing could be done for her. She was reported to be dying. She was found near to death's door from asphyxiation due to the weight of a huge goitre pressing on the trachea. A free incision was made in the middle line, the constricting band divided. The swelling could then be felt to be elastic. A free incision was made into each side of swelling; the swellings emptied. An uninterrupted recovery resulted. She has since joined her children in Canada, where she has resided for some years.

Intussusception.

One evening, in the month of December, a message came to see a baby living about five miles away in a cottage attached to a farmhouse. The child, a female, 3 months old, was suffering from symptoms of intussusception. A return journey was made and the necessary assistance procured. The driver of the hired conveyance lost his way in a snowstorm, which resulted in the operator falling into a ditch. The child was operated upon in a kitchen of the poorest description by candle light and was left to the mother's care. The case made an uninterrupted recovery, and the child has grown into a strong, healthy girl.

Strangulated Hernia.

In the middle of the night, in the depth of winter, a message came through the coastguard to visit an old patient, a female of 80 years of age, suffering from a strangulated inguinal hernia, and living in a neighbouring seaport village about five miles away. She lived in a two-roomed house. The room in which she was operated on was 10 ft. by 12 ft. by 9 ft., and occupied by three adults; she made an uninterrupted recovery, and four years afterwards is in good health.

One midsummer day an old parish male pensioner was seen. He was 77 years of age, and had been in feeble health for some years. He was found with a strangulated inguinal hernia and was vomiting. He had lived for years in a single room, and his bedding and surroundings were of the poorest description. He was immediately operated upon and made a perfect recovery, and I saw him the other day, some three years after, crawling along the street past my house in the bitterest weather.

Intestinal Obstruction.

One afternoon in September a telegraphic message came to see a woman suffering from intestinal obstruction. The woman, aged 42 years, lives in an overcrowded two-roomed cottage in the same village as the above case; the bedroom in which the operation was performed for herniated small bowel through omentum, was very dirty and infested with flies. She made an uneventful recovery, and has been at work ever since.

Gall Stone.

One October evening a message came to see a fisherman 62 years of age. He was found suffering from profound jaundice, with intense pain and incessant vomiting. After some hours of anxious watching, as no improvement took place, he was operated upon. The gall bladder was very small and was difficult to find. A very small calculus, about the size of a wax vesta head, was found. The patient made an uninterrupted recovery, and has remained well for some two years.

Suppuration of Gall Bladder.

A telegraphic message was sent late one evening to visit a woman living seven miles away. The message came as a surprise, for rumour had reached us that she had obtained entrance into a large provincial hospital. On this occasion she was found in a very exhausted condition. She had taken fright in the hospital and run away, and travelled some twenty odd miles by foot and cart to her home. She was suffering very severe pain in the right side of the abdomen, over a hard

tumour. Some five years previously she had been operated upon for an acute abdomen, when an abscess was found in the right iliac region and drained, and from which a permanent fistula had resulted. She lived in a two-roomed cottage, the bedroom being nothing more than a comfortable attic without a fireplace, with the rickety stairs leading thereto opening close to the bed. She was operated upon and a gall stone about the size of a walnut removed. She made an uneventful recovery.

Tracheotomy.

One winter's night, at 2 a.m., a call came to see a boy, aged 3 years. He was found suffering from diphtheria, with laryngeal obstruction—breathing with great difficulty and cyanosed. He was operated on by candle light, the operator administering the anaesthetic, the services of the district nurse alone being obtainable. He made a good recovery.

Amputation of the Thigh.

Late one evening a message came to see a lad who, it was reported, had met with an accident in a quarry. He lived seven and a half miles away in a tiny cottage on the moors. He was found with a crushed and torn left lower leg, the knee-joint a pulp, and the bones pulverized and in places protruding through the skin. The limb was there and then amputated above the knee by candle light, and the assistance of the groom. The boy made a very good recovery, and is now earning his living as a tailor.

Appendicitis.

When returning home late one evening from a country insurance meeting, a request came to see a fisherman, who was known to have had a history of appendix inflammation. It was now evident that the patient was very ill with toxæmic poisoning and peritonitis. He was immediately operated upon. A foul abscess was opened in the right iliac fossa. The case made a slow recovery; the discharge continued for a long time, but the wound eventually healed. When he was considered to be about well he again developed signs of acute appendicitis. He was immediately operated upon, and a very large and swollen appendix removed. A further operation had to be done some six weeks later, as the wound did not heal. He eventually made a good recovery, and has been at work for some months.

Ectopic Gestation.

While on a round one morning a note was delivered requesting me to see a married woman for whom "something must be done immediately." An extrauterine fetation was thought to be the probable cause of the serious condition in which the patient was found, in answer to an emergency call to Dr. Adams. An immediate operation revealed an abdomen filled with blood, and a fetus (about six weeks old) in its membranes developing in the left Fallopian tube, close to the fimbriated extremity, and from which the hæmorrhage was proceeding. When placed back in bed life seemed to be all but extinct, but she made a rapid and uneventful recovery. The house was a tiny two-roomed cottage, and poor in every way.

THE PLACE OF X RAYS IN THE TREATMENT OF CANCER.*

By FRANK FOWLER, M.D.,

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THE results of *x*-ray treatment, up to the last year or two, have been impaired by the mistaken notion of the physicists that a cell is only affected by a ray which it is able to absorb, and that the more penetrating ray, which passes through it, had no effect on the cell. The fallacy of this theory was demonstrated by the radium therapists, who showed that the gamma rays of radium, which are far more penetrating than any *x* rays yet produced, have very marked effect on any cancer cells which they are able to reach in sufficient quantity; in fact, the results of treatment by radium of suitable cases are better than those produced by *x*-ray treatment, and it is now believed that this superiority is due to the greater penetrating power of the gamma ray.

Radiologists have consequently tried the effect of using *x* rays from a tube as hard as possible, in order to produce more penetrating rays, cutting off the softer rays by means of suitable filters; the results are proving far more satisfactory than when medium hard rays were used.

The reason why *x* rays have maintained their place in the treatment of cancer is not merely on account of the difficulty of obtaining sufficient radium; but they have certain advantages of their own—chiefly the possibility of giving a fairly uniform dose over considerable area and depth, whereas the radiation from a tube of radium is only effective within comparatively short distances.

* Read at the Southampton Medical Society.

The question whether x rays or radium should be preferred in the treatment of a case of cancer may be decided, broadly, on the size of the area which it is necessary to treat and its accessibility to either agent. Thus, in carcinoma of the mouth, oesophagus, rectum, or cervix, radium can be applied directly to the growth, and should be preferred for the treatment of the primary growth, although x rays may be necessary to supplement the radium in the treatment of the lymphatics draining the part.

On the other hand, if the primary tumour is large—for instance, scirrhus of the breast as large as an orange—it would not be possible to treat it homogeneously by radium; even if the tube be inserted into the growth, the part immediately surrounding the tube gets an overdose and will slough, while the periphery does not get enough radiation to arrest growth; such a tumour may be x rayed from three or four different directions, so that all parts, including the deep, receive an effective dose, and the tumour does, in fact, frequently diminish in size.

I do not recommend x -ray treatment of any operable primary tumour, with the possible exception of an atrophic scirrhus of the breast which has been present for ten years or upwards; in all other cases the patient should have the benefit of the proved advantages of surgery.

The effect of radiation on the cancer cells is not only direct; an effect is produced by the reaction of the body, consequently it is useless to expect improvement in a patient who is already cachectic. We are familiar with the theory of immunity to infectious diseases, but we are less apt to recognize that the different degrees of malignancy of tumours, histologically identical, are due to the varying resistance of each individual.

The treatment of cancer cells, whether in a primary or secondary growth, or in lymphatic glands, produces an increase in the resistance of the body to cancer, but it acts by multiplication and not by addition, and cannot have any effect in cases of zero resistance.

The rays affect certain tissues and cells more than others, lymphoid tissue and the endothelium of blood vessels are particularly susceptible to it, and all cells that are undergoing rapid reproduction are more affected than other cells where reproduction is normal. A rapidly growing carcinoma, rich in blood vessels, and spreading by the lymphatics is thus attacked in three ways: (1) The rate of reproduction of epithelial cells is checked; (2) the endothelium of the blood vessels proliferates until the lumen is almost obliterated; and (3) the channels for metastasis are blocked.

The result of x -ray treatment of enlarged glands is very satisfactory; if commenced before they are larger than hazel nuts they almost invariably disappear, where the general condition of the patient is good. In a case I recently began to treat, the whole side of the neck was infiltrated and many glands were palpable. I do not expect to get complete resolution, but only to retard the growth and prevent fungating of the mass, and to give considerable relief to pain. The patient tells me that she has had no morphine since commencing the treatment. She had a scirrhus of the breast removed in India, and has had a secondary operation for recurrence in the glands of the neck; it is significant that she received prophylactic x -ray treatment to the breast area alone.

I believe the operation for secondarily infected glands in the neck after removal of the breast is very seldom satisfactory, and I consider that x -ray treatment offers a better chance to the patient; indeed, the whole question of surgery of the cervical glands needs to be revised. The results of the treatment of glands, not only malignant disease but also in tubercle and Hodgkin's disease, seem to be undoubtedly better than excision. I seldom see tuberculous glands before they have been operated on, and if the recurrence will disappear—as it generally does—it seems reasonable to suppose that the patient might have been spared the disfigurement that excision produces.

Secondary cutaneous nodules often disappear after x -ray treatment. I have an impression that these are becoming more rare.

PROPHYLAXIS.

When the effect of radiation on macroscopic tumours became recognized, the idea naturally suggested itself that it would be better to attack the cells while the mass was still microscopic, or to treat the area purely for prophylaxis.

During the last four or five years we have been making the experiment, at Bournemouth, on as large a scale as possible; we treat every case of cancer of the breast, lip, or tongue, that is operated on at the hospital, and endeavour to get the patient to continue attendance for two years—the amount of work is considerable, but we have shown that it can be done, and we believe that a few more years' experience will prove that it ought to be done in every hospital. From the summary of the work of the x -ray department of St. Thomas's Hospital, recently published,¹ we gather that we have treated twice as many patients in Bournemouth at our 100-bed hospital as have been treated in this great London hospital. I am an old St. Thomas's student, and I know that the work in the x -ray department is admirably done, but evidently the surgeons do not send their cases. We at Bournemouth owe a great deal to our surgeons for their co-operation, and to our Hospital Committee for their acquiescence in the expense the experiment involves.

Every case is treated not only at the site of the original growth, but all the lymphatic areas draining the part are also treated, and from as many directions as possible; thus the breast cases receive pastille doses of filtered rays on the scar, the axilla, the supraclavicular area and the scapula, each area receives at least six doses in the first course of treatment, the intervals between each dose being three weeks (or fourteen days if there is any reason to suspect that early recurrence is likely); a second and third course is given later. Our difficulty is that we do not yet know what is the minimum dose necessary for prophylaxis, or how long treatment must be continued; further experience will determine these points.

I will not weary you with any figures, but will give my general impressions of the results of our four years' work so far as can be seen at present, fully recognizing that a much longer period must elapse before reliability can be attained.

1. Secondary infection of the mediastinum was a frequent cause of death in our earlier cases of breast scirrhus, but since the method of raying the chest from four directions has been adopted, the mediastinum receives sufficient radiation to make any recurrence here rare. I may say that the most frequent cause of death now seems to be secondary infection of the liver or of the bones, not infrequently those of the pelvis.

2. Local recurrence in the neighbourhood of the scar very seldom occurs. We are confident that we used to see far more recurrence in cases within four years after operation. I have mentioned that secondary cutaneous nodules appear to be less frequent.

3. The time is too short to attach too great importance to apparent diminished frequency of recurrences, but I can quote one result that is a definite success for x -ray treatment, and in itself justifies the trouble and expense of treatment. It is this: I do not know of a single case which we have treated that has an ulcer as large as half a crown. This includes not only cases sent for prophylaxis, but inoperable primary growths, some of which were ulcerating when we began treatment and have healed since, and also cases in which there were large masses of malignant glands; none of these show any tendency to fungate.

A great deal of the popular dread of cancer is based on the ulceration in advanced cases, in fact, the very name was taken from the fungating mass that was expected. We do not claim to cure cancer, but we claim this—the patient can be protected from the pain, sepsis, and stench of an open sore, and it is undoubtedly our duty to spare no pains to prevent such a serious condition.

Surgeons have developed the technique of operations for cancer in order to remove the disease as widely as possible, as well as all accessible lymphatics, and I agree that the results of operations so performed have given the patient a better chance of non-recurrence than the older method of simple excision of the growth, but it is always necessary to be ready to modify technique to meet advances in other forms of therapy, and I believe that it should be very seriously considered whether it may be now possible to leave the prophylaxis of glandular enlargement to the radiologist. For instance, in operations for cancer of the breast I find that many surgeons agree that it is not advisable to divide the clavicle for the purpose of removing enlarged cervical glands. I do not think it is possible to clear away these glands as completely as can

be done from the axilla, and the danger of partial removal is well known; even the clearance of the axilla has disadvantages in the longer time necessary for the operation, but chiefly from the danger of oedema of the arm supervening later, even when the modern incision is made along the anterior border of the axilla. Bearing in mind the possibilities of other forms of therapy, I think the time has now come when the surgeon should consider in each case whether he should attempt to remove all lymphatics within his reach or whether he may preferably leave the prophylaxis, or even treatment, of enlarged glands to the radiologist. At our request one of our surgeons has had the courage to leave the axilla alone in several cases in which he has operated for scirrhus of the breast, and so far he has not had cause to regret his boldness. The cases were sent to the x-ray department for prophylactic treatment as soon as they were out of bed.

Conclusions.

1. All cases of carcinoma of the breast, lip, or tongue should receive efficient x-ray treatment for prophylaxis immediately after operation.
2. In the treatment of secondarily infected glands x rays are preferable to excision.
3. Efficient treatment is able to prevent local recurrence; mediastinal infection is rare, and ulceration should not occur.

REFERENCE.

- ¹ *Proceedings of the Royal Society of Medicine.*

A SMALL OUTBREAK OF EPIDEMIC CEREBRO-SPINAL MENINGITIS.

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With a Note on the Bacteriology by P. J. VEALE, M.B.

DURING 1913 and the early part of the present year cases of epidemic cerebro-spinal meningitis have been occurring at intervals in Bristol. In all 33 cases were notified up to February 28th, 1914; of these, 3 which came under our personal observation are known to be due to the pneumococcus and not to the meningococcus. Owing to the difficulty of diagnosis in certain cases, it is probable that the total number of cases was greater than those actually notified. Nearly all the patients came from the poorer parts of Bristol. In January to February, 1913, two cases occurred in each of two districts nearly two miles apart, Stapleton Road and Bedminster; two cases occurred in the same street. In April five occurred close together in another poor district near Stapleton Road, and two further cases occurred in this district in July, 1913, and February, 1914 respectively. From December 5th to February 28th there was an outbreak of 12 cases in Bedminster—a district about two miles distant from the others, and of three more in the Stapleton Road district. The contiguity of the individual cases in the groups is interesting, yet although the patient was often one of a family of children, there is, so far as was ascertained, no instance of a second case from the same house. Besides these cases 6 others occurred in outlying parts of the city, in healthy districts on high ground; their distribution is curious as they occurred in pairs, the houses being within about 200 yards of each other. Two cases occurred in each of three districts widely separated from each other and the other parts of the city previously or subsequently affected; the interval between the two cases in each district was one, two, and six months respectively. In two of these instances the families were certainly not acquainted with each other. The contiguity of cases in groups in adjacent streets, and yet the absence of spread in families in the same house is certainly remarkable. Most of the patients were young children; moreover, in more than one case the child was at school, and no other case occurred in that school; one patient was 45 years of age, two just over 30, and of the remainder twenty were 10 years of age or under.

Turning now to the 20 cases under our own immediate observation, the disease was of the ordinary acute type rather than either of the malignant or mild type; four days was the shortest duration of illness. In several cases there was a prodromal illness consisting of cold or sore throat preceding by an interval of ten to fourteen days the attack of cerebro-spinal fever. In one case there was a history of a fall on the head at about the same interval.

As to the early symptoms, in several the illness began with fever, intense headache, vomiting, and speedy delirium. In other cases the signs were more general, with pains in the limbs, and drowsiness or slight wandering at night, the condition then closely simulating influenza, or, in two instances, enteric fever. In all there was fever from the first, and in nearly all a rigor either at onset or within the first three days, most often not repeated. In most cases the symptoms were very indefinite. There were no symptoms or grouping of symptoms which conferred any peculiar character upon this epidemic. The first pathognomonic sign was generally slight deviation of the head and neck to one or other side, less often some retraction. When the disease was well established the chief points in these cases as compared with the accepted descriptions of the disease were the pain in back of head and neck with muscular rigidity; absence of any marked degree of retraction of head; absence of complete paralysis of any muscles, though there was great muscular weakness; marked retraction of abdomen with absence of abdominal reflexes; rigidity of leg muscles, and Kernig's sign constantly present; knee-jerks present, no clonus; plantar reflexes indefinite, not obtained or flexor, very rarely of extensor type; optic neuritis in 3 cases only; absence of affection of cranial nerves; pupils dilated and equal; external strabismus in 2 cases; urinary incontinence present after the first few days. The rapid and profound emaciation was one of the most striking features in all cases. Delirium, generally mild and muttering, occasionally more violent, was also constant; and the continual restlessness was a characteristic sign. There was rarely difficulty of swallowing until the last stage, and vomiting soon ceased to be urgent after admission to hospital. Purpuric spots or patches sparsely scattered were seen in a few patients, herpes in six, so that skin rashes were infrequent. One case was a typical example of posterior basic form, and recovered after a long illness of several months' duration.

The cerebro-spinal fluid in these cases varied from being merely turbid to an appearance like pus. In most cases, but not all, it escaped under considerable pressure. Frequently rapid accumulation of fluid was found when a second lumbar puncture was done on the following day; in one case 50 c.cm. of cerebro-spinal fluid escaped at the second puncture, made thirty-six hours after the first. In all cases the fluid contained albumin, and a reducing body (sugar). The cellular exudate consisted almost entirely of polymorphonuclears in proportion of 90 to 98 per cent., but in one case which recovered the cell count on the fourth day of the disease showed polymorphs 32.5 per cent., lymphocytes 67.5 per cent. Meningococci were mostly very abundant, both intracellular and free in the fluid. In some of the cases a leptothrix bacillus was also present; the bacteriology of this organism is dealt with in Mr. Veale's note. The cultural characteristics of the organisms present were determined in every case.

In one instance no organisms were found in the cerebro-spinal fluid from the first puncture made two days before death, but a fair number of meningococci were seen in the fluid obtained on the following day. In three typical cases, all fatal, no organisms could be found in film preparations, nor could they be cultivated from the cerebro-spinal fluid, which was purulent or semi-purulent, with a high percentage of polymorphs. In the posterior basic case no organisms were found at any time on repeated examination of the cerebro-spinal fluid.

In the younger patients it was found necessary on three or four occasions to give an anaesthetic for the lumbar puncture on account of active delirium and restlessness. This was done without any unfavourable symptoms resulting. Seven cases out of the 20 under our care besides the posterior basic case recovered; of these, one was left absolutely deaf, one blind in one eye, and one mentally defective.