A British Medical Association Lecture ON THE LINES OF ADVANCE IN THE SURGERY OF BREAST CANCER.

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BY

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For many years after the operation for breast cancer had passed from the primitive stage of "cutting out the lump," its development proceeded by a method of "trial and error." A surgeon by clinical observations of his failures extended the scope of his operation in this or that direction. He then devoted himself to the collection of statistics showing the result of his particular method of operation. It was hoped by a statistical comparison of the results of different operations to arrive at the "best" operation.

There can be no doubt that very considerable advances were in this way realized by American surgeons, culminating in the Halstead operation, which for some years represented the best means for the surgical eradication of breast cancer.

It will be seen that this method largely eliminates the pathologist from the scheme of things. The surgeon "guesses" his method, aided only by clinical observation, and tries it out in comparison with the guesses of other surgeons. In the comparison, statistics necessarily play a dominant part. Now the essential vice of statistics, from which even Professor Karl Pearson has been unable to redeem them, is that they assume the homogeneity of a collection of unlike things. Even granting, however, that statistics will give an accurate idea of the value of a certain operation, it has to be remembered that the possible variations of operative method are infinite in number. They can never all be tried out. Cumbersome and slow in operation, the statistical method leads firmly to an inconclusive result. As Claude Bernard long ago pointed out, statistics are not a weapon of primary importance in the search for truth, though they may supply useful secondary or confirmatory evidence.

Let me illustrate my meaning by a comparison. There are an infinity of possible routes from London to Leicester. To ascertain the best line for a railway between these two places one would not proceed by a comparison of the routes advised by different travellers with statistics of their relative times. The construction of the railway would be preceded and determined by a systematic survey of the country. It may be fairly claimed that in the application of an analogous scientific procedure to the operative treatment of breast cancer this country has led the way. The special need was detailed knowledge of the mode of spread of the disease, only to be obtained by the microscope.

Sir Harold Stiles, the pioneer who first addressed himself to this task, detected cancerous lymphatics widely diffused throughout the breast, which, moreover, he showed to be a much more extensive organ than it had been generally considered. He drew special attention to the necessity of wide removal of the pectoral fascia, while deprecating the removal of an unnecessary amount of skin. In these respects the operation suggested by him and practised by Watson Cheyne from 1892 onwards was much superior to that of Halstead. Subsequent work has required only minor modifications in it.

Stiles was prevented from reaching a general conception of the mode of spread of cancer by the defects of his material, which consisted only of excised breasts. Working on *post-mortem* subjects at the Middlesex Hospital for several years from 1903 onwards I demonstrated the centrifugal spread of breast cancer in the fascial lymphatic plexus, and detected its microscopic growing edge in this plexus at points far removed from the breast—for example, in the deltoid region, or the upper abdominal wall. The only framework which fits the observed facts is the now generally accepted permeation theory, which has replaced the embolic theory of dissemination.

A criterion is thus provided for judging any suggested operation for breast cancer, and the surgery of the disease is placed upon a completer rational basis. Technical variations in the operation, of which many are possible, must conform to the following conditions:

1. The primary growth, from which centrifugal spread begins, must always be the centre of the operation area. Thus an operation for a growth of the inner edge of the breast is not the same as an operation for a growth of the outer edge.

2. A circular area of skin 4 or 5 in. in diameter and centred upon the primary growth requires removal.

Here I may digress a moment to explain that the opinion long held, that cancer spreads along the skin, is shown by pathology to be erroneous. The apparent spread of cancer along the skin is really a punctate spread to the skin at various isolated points from the infected subjacent fascial lymphatic plexus. Since this process is secondary to and later than the spread of permeation in the fascial plexus, it follows that the area of skin infected is small compared with the area of permeation in the deep fascia. The ablation of a very large area of skin is thus shown to be unnecessary, the removal of a large area of fascia essential. I submit, with all respect to Professor Halstead, for whose work and character I have a great admiration, that in these two respects the Halstead operation erred by excess and by defect. For while he removed a large area of skin, Professor Halstead did not fashion skin flaps by undermining so as to ablate a larger area of deep fascia.

3. A circular area of deep fascia 10 or 12 inches in diameter and centred upon the primary growth must be ablated. It is first exposed by raising thin flaps of skin and subcutaneous fat, then surrounded by a ring incision, then elevated all round its edge from the deep parts until the line is reached where muscle also must be removed. The removal of a maximal area of deep fascia is demanded by the presence in this layer of the growing edge of the disease.

4. The removal of deep fascia is often too limited in the epigastric region. I have shown that this region is specially dangerous because here only a layer of fibrous tissue separates the fascial plexus from the subperitoneal fat. It is here that by direct infiltration growth often reaches the peritoneal cavity. In all cases, except perhaps with a growth of the upper edge of the breast, an area of the anterior layer of the sheath of the rectus abdominis requires removal.

Recently I was asked to see a middle-aged lady who, four months after a blow on the breast, was operated on for cancer of the breast. Thirteen months later some small nodules were detected at the lower end of the operation scar. They were excised and x-ray treatment was begun. Fourteen months after the second operation she began to suffer from dyspepsia, with pain in the left epigastric region, culminating a fortnight later in vomiting like a bilious attack. These, I may remark, are the symptoms which characterize some of the cases of invasion of the abdomen at the epigastric angle. On examination I found a recurrent nodule, near the scar of the secondary operation in the epigastric region. The left lobe of the liver was palpable and irregularly indurated. It had become infected by contact with the cancerous epigastric peritoneum. There was no other definite evidence of secondary deposits. I believe, therefore, that, had the anterior layer of the rectus sheath in the epigastric region been more widely removed, this lady might still be free of her disease.

Recurrence in the Subclavian Glands.

These glands, I may remind you, more correctly named than the subclavian artery with which they have no relation, lie at the apex of the axilla, below the clavicle, between the subclavius muscle and the upper edge of the pectoralis minor. In front they touch the costo-coracoid membrane which separates them from the great pectoral muscle. On their outer side lies the axillary vein. They may be found infected in breast cancer when the lower axillary glands are still free from disease. This is due to the occasional existence of a lymphatic trunk which passes from the mammary region directly to them through the substance of the great pectoral muscle.

Recurrence in the subclavian glands presents itself in the form of a deep lump situated below the middle of the clavicle, and sometimes apparently adherent to this bone. This form of recurrence is frequent in the practice of surgeons who have not seen the necessity of clearing the axilla up to its extreme apex. In one week recently

I met with two cases of the kind. It is a form of recurrence which can be prevented with almost absolute certainty by careful axillary dissection, and the surgeon who slurs over this part of the operation incurs a heavy responsibility.

Obviously Inadequate Operations.

It is still not uncommon to see cases in which only a portion of the breast has been removed for cancer or in which the axillary dissection has been omitted. Rarely a week passes without a case of this kind coming under observation at my cancer out-patient clinic at the Middlesex Hospital. In some of these cases the lump has been considered innocent and the operator has failed to have it examined. The routine pathological examination of every supposed innocent tumour removed from the breast should never be omitted. Other cases have been in the hands of inexpert or occasional surgeons, who do not realize that the removal of a breast cancer is much more difficult than an appendectomy or the radical cure of a hernia. I venture to suggest that the operation for breast cancer should be left entirely in the hands of hospital surgeons, and that every surgeon who undertakes it should previously study the mode of spread of the disease.

OPERATION RESULTS.

Believing as I do that operation in breast cancer is worth doing to avert the distresses of external ulceration, even though the disease subsequently returns in the internal organs, and believing also that the interests of the individual case in this matter should outweigh the desire of the surgeon for a favourable statistical record, I have not refused operation in any case where I thought I could prolong the patient's life or make her end more comfortable.

Consequently I have no startlingly favourable results to record. Forty-eight per cent. of my cases which could be traced have remained free from recurrence for three years, as compared with 44 per cent. of Judd's and 47 per cent. of Halstead's cases. I may remark that in America cases come to operation earlier than in this country, as shown by the comparatively large percentage of cases without axillary gland enlargement in Halstead's statistics. I estimate that 90 per cent. of the cases of carcinoma which I see already have enlarged axillary glands.

It is when we come to consider the sites of the recurrence that the results become really interesting. A new type of recurrence, to which I have given the name intercostal recurrence, becomes a principal feature of the picture. Associated with this or separate from it, and even more frequently, recurrence in the supraclavicular glands is seen.

The local recurrences in and about the scar, usually multiple, which used to be found in 35 to 50 per cent. of cases of recurrence, have become rare. I confidently appeal for confirmation of this statement to any surgeon present who operates on the lines laid down by the permeation theory of dissemination. Cutaneous recurrences have been reduced to a very low percentage. In half the cases where they have been seen the usual prophylactic course of x rays, which I always advise, has for one reason or another been neglected. I have not seen any case of isolated axillary recurrence, nor of recurrence in the situation of the subclavian glands, and only one of recurrence in the remaining clavicular portion of the pectoral muscle. In some cases intrathoracic recurrence or return of the disease in the liver has taken place. In one case the first sign of return was in the femur on the side of the growth.

In a group of 26 cases of recurrence taken from my private notebooks, and including cases of palliative operation, the disease reappeared in the following situations:

Locally (two of these cases had escaped a proper x-ray course)	4
Supraclavicular	9
Intercostal	5
Peripheral fascial recurrence	2
Cerebral	1
Thoracic	4
Abdominal	1

Thus the majority of recurrences belong to what may be called (a) the supraclavicular, (b) the intercostal types. No case of diffuse flap recurrence—the type formerly so common—is noted.

Intercostal Recurrence.

The second common variety of recurrence—intercostal recurrence—is frequent in my experience. I am not acquainted with any precise description of this mode of return.

The first sign of it is the appearance at the inner ends of one or more of the first, second, or third intercostal spaces of small nodules, adherent to the intercostal muscles but not adherent at first to the skin. These nodules are probably an index of retrosternal deposits originating in the anterior mediastinal glands. Later on other similar nodules, also adherent to the intercostal muscles or to the ribs, appear along the first, second, third, fourth, and fifth intercostal spaces as far back as the mid-axillary line. The nodules, as they increase in size, become adherent to the skin and may ulcerate. They are distinguished from cutaneous recurrences by the fact that in their early stages the skin glides freely over them. It is obvious that they indicate lymphatic infection of the intercostal spaces, or of the anterior mediastinal glands, already present at the time of the original operation.

The interpretation of these results seems to be clear enough. The infrequency of local recurrence justifies the pathological principles of the operation. The recurrences take place beyond the range of the operation either in the anterior mediastinal or in the supraclavicular glands, less often in the viscera. It seems reasonable to infer that at the time of the original operation microscopic advance parties of carcinoma cells had already reached these glands.

We must therefore get our cases earlier, and we must devise some means of dealing with supraclavicular and intercostal recurrences either by way of prophylaxis at the time of the first operation, or by way of cure when these concealed dépôts first manifest themselves clinically.

I do not propose to deal to-night with the important matter of the education of the public in the recognition of the early signs of cancer. It would be easy to do too much in this direction and to disturb that sense of practical immortality which is one of the blessings of health in most normal individuals. We do not want to produce an epidemic of cancerphobia. What the public should know might be summed up in a few brief sentences:

After the age of 40 every individual is increasingly liable to cancer. Cancer is insidious in its onset and painless in its early stages. If taken in time, cancer may be cured by operation. If you are over 40, always get a doctor to examine you if you notice a lump or any departure from your normal state of health.

One of the principal obstacles to progress is the belief of the public that cancer cannot exist without pain. Medical men should miss no opportunity of correcting this mistake.

POSSIBLE EXTENSIONS OF THE PRIMARY OPERATION.

It would be quite possible to extend the scope of the original operation so as to include the routine exploration of the anterior mediastinum, and I have done this in six cases, all of which recovered. In only two of these did I find infected glands. In one of these two cases the growth, apparently an early one, was situated near the sternal margin of the breast. Widespread internal recurrence in the thorax took place within six months. In the other case, operated upon more than a year ago and at present free from recurrence, the glands showed irritative hyperplasia and contained a few small groups of epithelial cells.

It would thus appear that anterior mediastinal infection is present at the time of operation only in one case in three. When it is present, operative removal of the glands may fail to anticipate dissemination. For these reasons and because it increases the length and severity of the operation, I have abandoned exploration of the anterior mediastinum. Similar arguments lead me to reject the idea of routine removal of the supraclavicular glands.

Supraclavicular Recurrence.

Recurrence in the posterior triangle first manifests itself in the glands lying immediately above the clavicle and below the posterior belly of the omohyoid muscle. In examining the triangle special attention must be given to the angle between the clavicle and the posterior edge of the sterno-mastoid. Here on deep pressure an enlarged gland is often found lying in close contact with the subclavian artery. Infection of the supraclavicular glands takes place along the efferent lymphatics from the glands at the apex of the axilla, from the subclavian glands, and

sometimes from the anterior mediastinal glands. The subclavian group of glands might with advantage be renamed the infraclavicular glands. They lie, of course, behind the costo-coracoid membrane. When the supraclavicular glands are once infected, extension by permeation may take place along any of the trunks—afferent or efferent—connected with them.

According to Poirier and Charpy their lymph-vascular connexions may thus be classified:

Afferent Vessels.—(1) From the posterior part of the scalp, and the skin and muscles of the nuchal region; (2) from the skin of the pectoral region, or even from the mammary integument; (3) lymphatics accompanying the cephalic vein, which skip over the infraclavicular glands in which they should normally terminate; (4) from the axillary glands, especially from the humeral chain; (5) from the cervical portions of the larynx, trachea, and oesophagus; (6) from the pretracheal glands of the neck; (7) aberrant vessels of the internal mammary chain which normally discharge into the great veins; (8) occasionally from the chain of glands lying along the external jugular vein; (9) from the small glands lying in the thorax which accompany the recurrent laryngeal nerves.

Efferent Vessels.—These unite with the efferents of the sterno-mastoid glands to form a common trunk, the jugular trunk which joins the confluence of the internal jugular and subclavian veins.

It will be seen from the foregoing account that cancer cells which have reached the supraclavicular glands have attained a favourable strategic position for the extension of their attack on the body in various directions. They frequently penetrate to the external jugular and the occipital glands, and the union of the efferent trunks from the supraclavicular and the sterno-mastoid glands affords opportunities for the invasion of the latter set of glands which lie along and external to the internal jugular vein. Supraclavicular infection thus is the precursor of wide infection of the neck, and even of the cranial cavity.

In regard to the thorax the position is less unfavourable. It seems doubtful whether any direct vascular connexion exists between the pretracheal glands of the thorax and the supraclavicular glands. In many cases the pretracheal efferent trunks discharge directly into the great veins, and the avenue of permeation into them is thus cut off. It would seem that the only constant lymph-vascular connexion of the supraclavicular glands with the thorax is by way of the efferents of the small recurrent laryngeal chain of glands. This conclusion is an important one, for it justifies the hope that, as experience has now shown, a vigorous attack on enlarged supraclavicular glands may anticipate and prevent invasion of the thorax. If, however, periglandular infiltration with fixation of the enlarged glands has taken place, it is likely that infiltration of the dome of the closely adjacent pleura has occurred, and in such cases operation is useless.

The definite break in the continuity of the permeation channels imposed by the separate termination in the great veins of the lymphatics of the neck and of the thorax respectively is, as we have seen, a great encouragement to the surgeon who contemplates an attack upon supraclavicular glands. The complexity and extent of their lymph-vascular connexions in the neck is a factor which at first sight seems very unfavourable to operation. But all the glands in the posterior triangle are within operative reach, and so, too, are the deep or internal jugular glands. Acting on the advice of the late Sir Henry Butlin, I have for some years made it a rule in cases of infected supraclavicular glands to perform a complete lymphatic dissection of the posterior triangle, including also the internal jugular glands. The glands are removed in one piece still embedded in the connective tissue, and therefore with all their lymph-vascular connexions intact.

Treatment of Supraclavicular Recurrence.

There can be no doubt that the right treatment of supraclavicular recurrence in its earlier stages is operative. The operation must, however, be a very thorough and systematic one. On the other hand, it is futile to attempt the operative treatment of late cases of supraclavicular recurrence, where the growth has infiltrated the gland capsule and has passed into the surrounding tissues.

Broadly speaking, if the glands are mobile they should be operated upon; if they are fixed they should be left alone. But if the only fixed gland is situated at the lower and inner angle of the posterior triangle it is sometimes worth while attempting to enucleate it, and if the attempt is successful and a tube of radium is introduced into the

bed from which it came, a long period of freedom from recurrence may be secured, provided at the same time all the glands in the posterior triangle are removed.

The use of radium in the operation wound should never be omitted in any operation for supraclavicular glands. It minimizes the great risk of these operations, namely, that of general implantation of carcinoma cells on the raw surface and the subsequent development of a general boardlike carcinomatous infiltration of the field of operation—an unfortunate result which may follow operation in too late a stage.

The boundary line between the operable and inoperable cases, though broadly fixed by the mobility or fixity of the glands, has been pushed forward definitely by the use of radium tubes in the operation wound. In doubtful cases the decision should now be for operation, instead of, as formerly, against it.

It must be borne in mind that subsequent recurrence, say, in the thorax, does not necessarily imply the failure of the operation. Besides its main object, the eradication of the disease, it has an important secondary object—namely, to avert the agonizing brachial neuralgia which is so often seen in the later stages of supraclavicular recurrence. If this object is attained the operation has justified itself, even if the patient dies of some other manifestation of cancer.

The question arises, therefore, whether operation on enlarged supraclavicular glands should be undertaken even in cases where other secondary deposits are known to exist. As a rule this question must be answered in the negative, for in such cases the period of survival is likely to be a short one, and death may occur before pressure on the brachial plexus has had time to develop. It seems better in such cases merely to attempt to delay the development of the supraclavicular deposits by the use of buried radium.

Radiation in the Treatment of Breast Cancer.

In a disease which has such wide-spreading microscopic manifestations as breast cancer, surgical extirpation, though it remains our best resource, is evidently a clumsy weapon. It has for some years been supplemented by post-operative radiation by x rays. For the past fifteen years I have uniformly advised post-operative radiation, and my experience shows that cutaneous and subcutaneous recurrence is more likely to occur in cases which have escaped, for one reason or other, this prophylactic course. My practice has been to advise only a short course followed after an interval by a second course.

It is now known with certainty that by an adequate dose of radiation a mass of cancer cells can be killed, and the idea which has hitherto for the most part governed the use of radiation is the destruction of any groups of cancer cells remaining after the operation.

It would of course be preferable, instead of destroying the seed so to alter the soil as to make its growth impossible—in other words, to immunize the patient against his own cancer. For a long time I was sceptical as to this possibility, for whereas in the older parts of a breast cancer degenerate malignant cells enveloped by round cells or by fibrous tissue are normally found in large numbers, at the actual growing edge of the disease there is no round-celled infiltration. Here the healthy active cancer cells have excited no visible reaction and they appear to be accepted as normal denizens of the body. I inferred a close family likeness between the cancer cell and the normal epithelial cell which rendered unlikely the success of attempts to produce immunity against the cancer cell.

It remains a fact that no marked success has attended attempts to induce immunity in an animal against its own spontaneously occurring growth. Nevertheless, the aspect of the problem has lately become more hopeful, largely owing to the work of Professor Russ and his fellow-workers in the Middlesex Hospital Cancer Research Laboratories. Starting with the idea that the tumour substance itself removed, suitably irradiated, and then inoculated might prove to be an immunizing agent, Russ inoculated the irradiated tumour substance. Subsequently in a large percentage of cases the animal is found to be immune to a further inoculation of the active virulent tumour substance, which in a control animal would give rise to a large tumour. These results apply to mouse carcinoma and rat sarcoma.

In addition to his studies of the effect of radiation on tumour cells, Professor Russ is studying the action of radiation upon the response of normal tissues to tumour growth. He finds that if in a number of susceptible rats destined to be inoculated with rat sarcoma some of the animals are previously given repeated very small doses of x rays, this group becomes much less susceptible to the disease. If, however, immunized animals be given large doses of x rays their resistance is broken down and the animals, when reinoculated, bear growing tumours.

It would thus appear that the future of cancer therapy, in the breast and elsewhere, is bound up with a close study of the effects of different varieties of radiation. And since the effects may be harmful or beneficial according to the dose, the radiation must be employed in suitable and accurately measured doses. In using radiation for its destructive effect upon cancerous foci, we must be on our guard against at the same time lowering the general resistance of the body to the disease.

The use of radium in breast cancer has perhaps never, apart from operation, resulted in the cure of the disease, and when it is applied to the surface of the skin the maximum dose which the normal skin will tolerate is too small to deal effectively with any but immediately subcutaneous deposits. When a tube of radium is buried in the connective tissues, and at least half an inch away from the skin, a much larger dose can be given, and a 50 or even 100 mg. tube screened with 1 mm. of platinum can often safely be left *in situ* for twenty-four hours. Under these circumstances, and within a range of one or two inches, the local effectiveness of radium in destroying carcinoma cells greatly exceeds that of the hard x rays which are its chief competitor. On the other hand, with the amounts of radium at present available, it is difficult or impossible to irradiate the whole of the extensive area, a circle ten or twelve inches in radius centred upon the primary growth, within which recurrence may take place. The peculiar advantage of radium when used in the most effective manner—by burying the tube in the tissues—is its intensive action. The peculiar advantage of x rays is their extensive action.

These considerations serve to map out broadly the respective spheres of these two methods of irradiation which can often be used effectively in combination. X rays are specially suitable for prophylactic irradiation covering a wide area, or for the treatment of multiple scattered deposits in the pareties. Radium should be chosen in preference if the recurrence is single or if nodules are only present in one or several limited areas. Radium should certainly be preferred to x rays provided that the affected area is not too large to be dealt with, for I have frequently seen deposits refractory to x rays rapidly disappear under radium.

An effective prophylactic application of radium is after the excision of enlarged supraclavicular glands or the excision of an isolated recurrence wherever situated. A tube of radium is left in the wound, suitably screened, with special care to protect the skin flap from undue action. The risk of implantation recurrence is thus minimized and remaining groups of microscopic cancer cells are exposed to the full force of the radiation.

The beneficial action of radium is not confined to its destructive effect upon carcinoma cells. It appears to have a special anodyne effect, and it sometimes relieves pain in cases of cancer where its effect upon the growth itself is small.

There are striking differences in the vulnerability of carcinomata to radium. Some of them yield rapidly, others are refractory. It should be remembered that some growths have a special tendency to cell degeneration, entirely apart from treatment, while in others most of the malignant cells are vigorous. Thus great variations in vulnerability are to be expected.

It must not be forgotten that small doses of radium stimulate cell activity and mitosis. There is here a distinct danger, for while the cells near the radium tube may be destroyed, more distant ones may assume increased activity. Thus the ideal method of applying radium would be similar to that adopted in the pursuit of big game—namely, to corral the game in a continually narrowing ring of beaters. In other words, if an area can be defined within which the malignant cells are known to be concentrated this area should be attacked by radium from its

periphery towards its centre. It seems to the writer that this principle, though difficult to apply, may prove to be a practically valuable one.

I have never seen evidence in breast carcinoma of any beneficial action of radium on deposits at a distance from the site of application. Such phenomena are occasionally seen in lympho-sarcoma, but I am inclined to think that the action in breast cancer is a purely local one.

With all its limitations radium has secured a definite position in the treatment of breast cancer. It relieves or postpones pain and disability, it prolongs life, and it often substitutes a painless *exitus* from internal recurrence for the distresses associated with ulcerated external recurrences, or the agony of enlarged glands pressing on the brachial plexus. In the case of single recurrences it may presumably complete the cure of the disease.

In favourable cases, and where if necessary the application is repeated, life may be lengthened by three years or more, and the patient enabled to live during this period an almost normal social existence.

The following cases illustrate the use of radium in recurrent breast cancer.

CASE I.—Carcinoma of Breast: Operation: Recurrence in Supraclavicular Glands: Excision of Glands, Radium Buried in Wound: No Recurrence Eight Years Later.

In 1912 I was asked by a London surgeon to see his mother, then aged 79, for a carcinoma of the left breast. The growth was removed under nitrous oxide anaesthesia supplemented by ether. I saw her again in December, 1913. She was in excellent general condition and could walk a mile, but in the angle behind the sterno-mastoid and the clavicle on the left side there was a fixed mass, evidently glandular. A further operation was undertaken on December 16th, 1913, and the glands were cleared out of the posterior triangle as high as the spinal accessory nerve. The carotid sheath was opened and the glands within it cleared out. The apparently fixed mass shelled out fairly easily from behind the sterno-clavicular joint, leaving a cavity large enough for the insertion of a finger. Higher up were enlarged glands deeply pigmented by carbon, and above these again were the normal glands of the carotid sheath. A tube of radium emanation was left in the cavity for twenty-four hours. At the present time, eight years after the first operation, this old lady remains well and free from recurrence.

CASE II.—Recurrent Carcinoma: Survival Estimated at a Few Months: Repeated Radium Treatment with Uniform Local Success: Patient still Living an Active Life Two and a Half Years Later: Survival for Nearly Three Years.

Mrs. O., aged now about 60, was operated upon at the end of 1912 by a well known surgeon in Edinburgh for carcinoma of the left breast, first noticed in the previous May. A guarded prognosis was given. In May, 1917, a small blood cyst formed at the middle of the scar and burst, leaving a deep ulcerated cleft. Dr. Mackenzie of Bath recommended a trial of radium, but the surgeon who had operated discountenanced its use, and gave her but a few months to live. At this juncture, in May, 1917, I first saw the case with Professor A. M. Stalker of Aberdeen. There was at this time a recurrence $1\frac{1}{2}$ in. in diameter fixed to the sternum, with enlarged left supraclavicular glands and an ulcerated nodular thickening of the scar, opposite the seventh rib. Two 50 mg. tubes of radium were inserted beneath the sternal nodule, one of 100 mg. in the left supraclavicular region, and one of 50 mg. in the nodule near the seventh rib. The screen was 1 mm. platinum and the period twenty-four hours. In August, 1917, the patient was feeling and looking well, and the only remaining palpable recurrence was a gland above the left clavicle.

As will appear, the subsequent history of this patient to date (January, 1920) is one of centrifugally spreading recurrences yielding rapidly and completely to further applications of radium. Seven applications in all have been made.

In October, 1917, at Harrogate, a tube of radium was buried above the left clavicle, and one in a new nodular thickening close to the seventh rib. All the winter of 1917 the patient was "most comfortable," and lived an ordinary life as much as possible in the open air. Professor Stalker reported in March, 1918: "There are two or three small glands, less than a pea in size, in the axilla. There is some infiltration in the left supraclavicular region, into which you introduced the radium to begin with. This is the spot which I fear most." Nevertheless, in December, 1918, the patient was "wonderfully well." In March, 1919, Professor Stalker found indications of spread in one or two directions. The ulcer near the seventh rib, though quiescent, never completely healed, and some nodules appeared external to it. In May, 1919, tubes were buried in the right supraclavicular triangle (100 mg.) where a fixed mass of glands had appeared, and the right edge of the sternum, where there was a suspicious thickening, and one in the nodules near the seventh rib. The screen was 1 mm., the time twenty-four hours. This application was followed by severe neuralgic pain down the right arm, which took several months to subside, and left some permanent weakness of the muscles of the hand. The neuralgic pain was probably due to the contraction of a neoplastic mass adherent to the brachial plexus. As before, the treated nodules disappeared within two months of the

irradiation, and even before she left London—that is, three weeks after the application—the supraclavicular lump had shrunk to half its original size, the ulcerated patch had improved considerably, and the sternal thickening could not be felt. A skiagram taken in Bath in 1918 showed suspicious thickening of the root of the left lung, and I was not at all sanguine as to the future. In August, 1919, a small nodule appeared below the right clavicle. In October, 1919, the patient was sleeping wonderfully well, but after a severe cold Dr. Stalker detected some dullness at the left base.

On November 1st, 1919, I saw this patient at her home in Scotland. About three weeks previously she had had a bronchitic attack, with pain at the base of the left pleura, and here a little fluid was present. Her general condition previous to this attack had been so good that she was driving out daily, sometimes in an open vehicle. She was sleeping well and was free from pain. On the left side of the chest—that originally affected—no overt sign of malignant disease remained. In the left supraclavicular triangle and the left axilla no glands could be felt, though above the clavicle large glands had been present prior to the radium treatment. The ulcer, with surrounding nodular deposits, though still open, had partly healed, and was quite flat and innocent as to its base and surroundings. No trace of the original large sternal swelling remained. On the right side, however, though the intercostal deposits in the second and third spaces had disappeared, the disease had made progress under the right breast. Here a large mass was present, with a smaller one in the upper and outer quadrant. The large fixed gland in the lower and inner angle of the posterior triangle—treated six months previously—had disappeared. Over the middle of the right clavicle one small nodule had appeared. The whole right breast was heavy from lymphatic oedema and the nipple swollen. There was some fullness over the lower part of the sternum never noticed before. Radium, 1 mm. screen, for twenty hours was introduced—100, 50, 10, and 10 mg. in various situations beneath the right breast, 10 and 10 mg. at the right edge of the sternum, 10 mg. in the nodule beneath the clavicle.

Though the dullness at the left base was very suspicious, the general condition was excellent, the patient cheerful, and her colour good. The lymphatic oedema of the breast rapidly subsided. In January, 1920, the patient was sufficiently well to travel to Bath and to come down regularly to the family dinner. While at Bath sternal swelling recurred and the right breast became oedematous. A further dose of radium repressed these external manifestations, but signs of rapid pulmonary involvement, with dyspnoea and increasing dullness at the left base, showed that the end was approaching. In April, 1920, she returned to Scotland. Temporary improvement followed, but she died early in May, 1920.

She certainly owes to radium more than two additional years of comfortable and even enjoyable existence, though the treatment was begun when she had been given only a few months to live. X-ray and open-air treatment were used throughout as adjuvants.

CASE III.—Recurrence after Operation for Carcinoma Mammæ: Radium, X-Ray, and Operative Treatment: Three Years Later no Sign of Active Disease.

In September, 1916, I operated on Mrs. D., aged 60, for a rather advanced carcinoma of the upper and outer quadrant of the right breast. A section confirmed the diagnosis. She subsequently had x-ray treatment by Dr. Prowse of Brighton. In March, 1917, she developed a thickening, soon becoming definitely nodular, over the sixth right costal cartilage. Another nodule appeared higher up at the edge of the sternum. The nodules disappeared completely after the insertion in June, 1917, at the site of each for twelve hours, of a 50 mg. tube of radium with a 1 mm. platinum screen. In September, 1917, there was some general swelling of the arm, but not to a serious extent. In October, 1917, Mr. T. H. Ionides of Brighton detected a lump at the outer edge of the right latissimus dorsi. X-rays failed to reduce this nodule, and I excised it. A section showed degenerate but still living carcinoma cells. All this time the patient's general health was good and she had very little pain. In July, 1918, a lump appeared in the right supraclavicular region, and this was successfully treated by burying a tube of radium. In December, 1918, a skiagram of the chest by Dr. Prowse showed no sign of secondary deposit. Her husband wrote that she "seems wonderfully well and certainly looks it." The slight swelling of the arm continued much as it was, with variations from time to time. Up to November, 1920, this lady had developed no fresh signs or symptoms. Thus three and a half years after the first recurrence the disease remains in abeyance, and meantime the patient has lived a comfortable and almost normal life.

CASE IV.—Supraclavicular Recurrence Successfully Treated by Operation and Radium: Death from Thoracic Deposits.

Mrs. H., aged 59, was sent to me by Dr. Simson, of Grosvenor Street, in January, 1914. In the previous year another surgeon had removed a carcinoma from the left breast. She now had enlarged glands in the left posterior triangle, which upon removal on January 4th, 1914, were found to be carcinomatous. In April, 1914, her general condition was satisfactory and she was free from pain, but two or three small nodular recurrences were present in the posterior inferior angle of the posterior triangle. They were treated by burying a tube of radium. Radium treatment was repeated in 1914, and in November, 1914, the nodules had disappeared. About this time she had developed

bronchial symptoms, and she shortly afterwards died with thoracic recurrence. In this case radium combined with operation probably averted pressure upon the brachial plexus and thus made the patient's end a comparatively easy one.

CASE V.—Recurrence in the Left Supraclavicular Glands: Excision and Radium Treatment: Rapid Recurrence at the Base of the Left Pleura.

Mrs. H., aged about 45, was sent to me in 1916 by Dr. Hobart of Cork. The left breast had been removed for carcinoma in 1914. The left supraclavicular glands were hard and enlarged. There was no other sign of recurrence. I excised the glands, leaving a tube of radium in the wound for twenty-four hours. Three months later there was evidence of pleural growth at the base of the left lung, and the patient did not long survive. There is, however, reason to think that the operation saved her from nerve pressure upon the brachial plexus. This case illustrates the disappointments that may be met with in the treatment of recurrence, and shows that an x-ray examination of the chest should always precede operation in such cases.

CASE VI.—Intercostal and Supraclavicular Recurrences Suppressed by Radium: Later Signs of Thoracic Metastases.

A. B., aged 55, was operated upon by me for cancer of the left breast in August, 1915. In December, 1917, a lump appeared in the second left intercostal space, but she ignored it until March, 1919. In April, 1919, two 50 mg. tubes of radium were introduced into the first and second space, and by June 16th the lump had disappeared. In October, 1919, there was no return, but slight prominence and tenderness had appeared over the right half of the first piece of the sternum and radium tubes were introduced here. In November, 1919, the patient came up stating that she had never been so well before, but on examination two hard glands were felt in the left supraclavicular triangle. On January 1st, 1920, four tubes of radium, 200 mg. in all, were introduced into the left supraclavicular triangle, the left axilla, and the right sternal region. On March 3rd, 1920, no glands whatever could be felt, but there was shortness of breath and some dullness at the left base; probably there is infection of the lungs and pleural cavity and the patient's days are numbered. But radium has kept her comfortable almost to the end and has given her an extra year of enjoyable life.

CASE VII.—Intercostal Recurrence: Improvement under Radium Treatment.

C. A., aged 68, was operated upon for carcinoma of the right breast at St. George's Hospital in 1917. In March, 1919, she attended the Middlesex Hospital for a recurrent fluctuating mass with reddened skin at the inner end of the fourth right intercostal space. It was incised, but no pus escaped, and was evidently a mass of degenerate growth. She was admitted for radium treatment, and in June, 1919, only a thick scar remained at the site of the lump. In October, 1919, the lump was again increasing, and there was vague induration of the left breast and enlargement of a left axillary gland.

CASE VIII.—Intercostal Recurrence: Radium Treatment: Relapse after Great Initial Improvement.

Kate G., aged 59, was operated upon in January, 1913, for carcinoma of the left breast. In March, 1914, a swelling was noticed over the manubrium. In June, 1914, two 50 mg. radium tubes with $\frac{1}{2}$ mm. screens were inserted for twenty-four hours. A second application was given in November, 1914. In December, 1914, the lump over the sternum had disappeared except for one slight local thickening. In February, 1915, there was no sign of growth, but in May, 1915, there was some thickening at the left margin of the sternum. The patient shortly afterwards ceased to attend.

CASE IX.—Late Intercostal Recurrence: Successful Treatment by Radium: Patient Well Two Years Later.

A. L., aged 58, was operated upon in 1906 by Sir A. Pearce Gould for carcinoma of the left breast. She remained well until September, 1918, when a lump appeared at the inner end of the second left intercostal space. It was a fixed induration adherent to the bones. On November 23rd, 1918, a 50 mg. tube of radium with 1 mm. platinum screen was buried under the lump for twenty-four hours. On December 1st the lump was much smaller, and on April 9th, 1919, no trace of a lump could be detected. In January, 1920, there was no trace of a return of the lump, but a suspicious fullness was present over the inner end of the first space. In March, 1920, tubes of radium were buried at the inner end of the first and third spaces in order to anticipate events. Patient remains well (June, 1920).

This case goes to show that the later the time at which the recurrence first appears the more likely is it to be amenable to radio-therapy. This impression cannot yet be submitted to a statistical test.

CASE X.—Intercostal Recurrence Seven Years after Primary Operation: Disappearance under Radium.

A. G., aged 52, attended at the Middlesex Hospital in February, 1920, for a fixed intercostal recurrence in the second left space. The left breast had been removed for carcinoma seven years previously. After radium treatment the sternal recurrence completely disappeared, but an enlarged gland could now be felt in the lower and inner angle of the left posterior triangle.

CASE XI.—*Intercostal Recurrence Refractory to Radium Treatment.*

Emma M. in June, 1916, was operated upon for carcinoma of the right breast. She attended the Middlesex Hospital in July, 1917, for a typical intercostal recurrence in the first right space. Two 50 mg. tubes of radium with $\frac{1}{2}$ mm. screens were introduced into the lump on November 7th. In the following January no diminution in the lump had occurred, and in February the lump involved the second space as well as the first, and recourse to sedatives was necessary.

This case suggests that results are better with a 1 mm. screen than with a thinner screen, a suggestion borne out by my experience in other cases.

CASE XII.—*Intercostal Recurrence One Year after Operation: Treatment by Secondary X Rays: Patient still Well, Ten Years after First Operation.*

Mrs D., aged 61, noticed in 1909 a small kernel in her right breast. She consulted me in March, 1911. A lump $1\frac{1}{2}$ in. in diameter, adherent to the fascia, was present in the upper and inner quadrant of the right breast. The glands in both axillae were enlarged, especially those on the right side. The growth proved to be a cellular one of duct origin, and many of the epithelial masses showed central degeneration. Prophylactic x rays were given after the operation. In May, 1912, nodules were noticed in the second, third, and fourth right intercostal spaces at their inner ends, and one or two nodules further out along the intercostal spaces. Bismuth carbonate injections were made at the inner ends of the affected intercostal spaces, and subsequently another course of x rays was given. The patient followed my advice to live an open-air life. By September, 1912, no trace of the nodules remained. One doubtful nodule was felt over the upper end of the sternum, and here and in the fifth intercostal space, where a slight thickening remained, bismuth was again injected. The x rays were continued.

There was no doubt of the recurrence, for the nodules were definite and rounded. At the present time (January, 1920) there is no trace of them, and the patient remains well. In 1918 she had some enlargement of the left axillary and supraclavicular glands, but this has subsided under x rays. The method of secondary x rays employed in this case has been superseded by the use of radium.

CASE XIII.—*Intercostal Recurrence Five Years after Operation for Breast Cancer: Radium Treatment; Patient Well nearly Two Years Later.*

Mrs. S., aged 28, noticed early in January, 1912, a lump in the left breast. She consulted me on January 18th, 1912. There was no skin adhesion but some fascial fixation, and very marked mastitis in the right breast. Preliminary exploration showed that the tissue looked like mastitis, but immediate examination showed it to be malignant. The great pectoral was removed except uppermost clavicular fibres, and the lesser pectoral and serratus left. The supraclavicular region was not explored. A small piece removed from the right breast was innocent chronic mastitis. Prophylactic x rays were given after the operation. In October, 1912, there was no sign of recurrence whatsoever and perfect mobility. The patient, who was a keen sportswoman, played golf during the summer, and won two medals within six or seven months of the date of operation. In 1917 there was a tiny lump at the junction of the upper border of the left second costal cartilage with the sternum, and the patient was given another course of x rays. In December, 1918, there were two small recurrences in the second and third left intercostal spaces. The patient had been doing very hard muscular work which may have predisposed her to these. I removed the recurrence in the second space and had it microscopically examined. I put in two tubes of radium, one in each space, and a week after the nodule in the third space had disappeared.

At the present time (October, 1920) there is no recurrence, and the patient looks well.

Question of Treating Operable Breast Cancer by Radiation.

I have met with one case in which a persistent effort was made to treat a carcinoma of the breast by x rays without operation.

CASE XIV.—*Operable Cancer Unsuccessfully Treated by X Rays.*

Mrs. A. noticed a lump in the left breast in 1913. In the summer of 1916 she consulted a medical man who has had extensive experience in x rays, and who made a diagnosis of cystic disease of the breast. X rays were applied to the breast on fourteen occasions. The lump became smaller and a pucker appeared on the skin. The patient was thereupon advised to consult me. I saw her in January, 1917, and found a puckered scar over the upper and outer quadrant with slight subjacent induration. There was no adhesion to fascia, and no glands were felt. Section after operation showed a carcinoma. The epithelial cells were in small groups and many of them were degenerate. The glands were unaffected.

Apparently in this case the radiation exerted a deterring and delaying effect on the growth, and perhaps prevented its spread to the axillary glands, but there was no evidence of cure. The history of this case goes to justify the belief usually held that operable cancer should not be treated by radiation only. The exceptions to this rule

are (1) if the patient refuses operation; (2) in old and feeble subjects with atrophic cancers; (3) grave constitutional disease—for example, cardiac or renal disease or diabetes.

Treatment of Inoperable Primary Growths by Radium.

In cases where operation is excluded by the advanced stage of the growth, age, or constitutional disease, much benefit may be derived from the use of buried radium. The primary growth may even completely disappear, or short of this ulceration may be averted, a very great gain to the patient's mental and bodily comfort. So far, however, there is no proof that by the imperfect methods at present in use the spread of the disease is arrested.

The following cases illustrate the treatment of inoperable growths by radium:

CASE XV.—*Advanced Primary Growth of Breast: Great Local Improvement after Radium.*

A. H., aged 37, attended the Middlesex Hospital in December, 1914. The whole of the right breast was infiltrated by carcinoma and firmly adherent to the chest wall. There were very numerous nodules around the breast, and especially on the outer side. A mass of enlarged glands was present in the axilla and just above the clavicle. On December 9th, 1914, four tubes of radium, 187 mg. in all, were inserted into the right breast for twenty-four hours. On January 26th, 1915, the infiltration of the breast had almost disappeared and the organ had become freely movable; the nodules also were shrunken. Two slight areas of radium dermatitis were present over the sites of the insertion of the tubes. The patient ceased to attend.

CASE XVI.—*Inoperable Cancer of the Breast Treated by Radium: Marked Local Improvement, but Continued Centrifugal Spread.*

M. A. S., aged 49, attended the Middlesex Hospital in November, 1916, with an ulcerated mass in the lower part of the right breast and universal induration of the breast. There were hard glands in the axilla. In December, 1916, radium was inserted into the axilla and breast. The glands disappeared within a month, and the upper part of the breast was soft and slack. Growth reappeared in the supraclavicular region, and in January, 1917, extensive nodular skin deposits were present around the breast. Further treatment was deemed useless.

This case well illustrates the usual history of carcinomata of the breast treated by radium alone. There is marked local improvement, but the centrifugal spread of the disease continues unaffected. Such cases appear to show that, if possible, treatment by radium should be applied first to the peripheral growing edge, and later in a centripetal manner to the primary growth. But the practical difficulties involved are great.

CASE XVII.—*Inoperable Carcinoma of the Left Breast: Radium Treatment: Disappearance of the Primary Growth, but Extension of Growth in the Glands of the Axilla and Neck in spite of X Rays.*

A. A., aged 61, attended the Middlesex Hospital in July, 1915, for a lump in the axillary margin of the left breast. The skin was adherent and the supraclavicular glands on the left side were much enlarged. Treatment by buried radium. In October, 1915, the supraclavicular glands were palpable and hard, but not enlarged, the primary tumour had disappeared, leaving only a vague induration. In December, 1915, no lump whatever could be felt in the breast. In April, 1917, the primary growth had not recurred, and there was merely an adherent scar, but there were large masses of nodular glands in the axilla and above the clavicle. X-ray treatment was being continued.

This interesting case illustrates that the complete disappearance of the primary growth does not mean the arrest of the disease. I have seen the same thing happen after radium treatment of carcinoma of the lip—complete cicatrization of the primary growth, and later the appearance of a mass of secondary glands.

CASE XVIII.—*Disappearance of Primary Growth under Radium.*

Mary W., aged 49, attended the Middlesex Hospital in February, 1916, for a cancer occupying the centre of the left breast. Radium was inserted on February 29th, and on March 29th the growth had almost entirely disappeared, though glands could still be felt in the left axilla. The patient was subsequently lost sight of.

CASE XIX.—*Carcinoma Treated by Radium without Operation: Growth in Check Two Years later.*

F. A., aged 60, in June, 1917, noticed a lump in the left breast. In June, 1918, when she sought advice, there was a carcinoma in the breast the size of a large orange, immovable and attached to the skin. The glands in the left axilla were enlarged. She refused operation and was admitted in August, 1918, for treatment by buried radium tubes. On September 11th the breast was much smaller, softer, and more mobile—an extraordinary improvement. In October, 1918, an induration, possibly a second primary carcinoma, appeared in the upper and outer quadrant of the opposite breast, and she was sent for x-ray treatment. In April, 1920, no further developments had occurred, and the growths appeared to be still in check.

Radiation as a Preliminary to Operation.

Dr. N. S. Finzi believes that it is advisable to give a large dose of x rays just prior to operation, and I am inclined to think that the practice is a sound one, though its value is not easily susceptible of proof. It should not be allowed to delay operation. Recent work at the Middlesex Hospital goes to prove that the resistance of the patient to carcinomatous infection may be increased by a small dose of radiation prior to operation.

There is no doubt that radiation frequently converts an apparently inoperable tumour into an apparently operable one. I have met with three such cases during the past year.

Natural Cure of Cancer in Relation to X-Ray Treatment.

It is not possible to form a correct estimate of the value of radiation in cancer without taking into account the natural tendency of the disease to undergo local repair. In a lecture on this subject I came to the conclusion that "Every aggregation of cancer cells, after increasing in size for a varying period and for a varying rate, tends spontaneously to undergo certain degenerative or regressive changes. These changes begin at the centre of the mass, spread centrifugally to its circumference, and may terminate in the replacement of the mass of cancer cells by a fibrous scar."

These changes, which are exemplified in the ulceration of a primary growth and in the umbilication of secondary deposits in the liver, appear to depend upon a breakdown of the improvised vascular commissariat of the growth and upon the harmful internal pressure produced by the active proliferation of the cancer cells. These degenerative changes can be seen beginning even when the collection of cancer cells is still of microscopic size, as is a permeated lymphatic. Their onset is invariably accompanied by the advent of collections of lymphocytes to the neighbourhood. It is thus possible that in every carcinoma we have to deal with a comparatively small number of perfectly healthy and active cancer cells and with a large mass of more or less degenerate and dying cells. The former class of cell is to be found in the permeated lymphatics of the microscopic growing edge and at the edge of microscopic nodules of growth which are still in the actively infiltrating stage. It seems likely that these two classes of cell differ widely in their reaction to radiation. It is probable that the crowds of degenerate cells which constitute the mass of a carcinoma may fall a ready prey to the reaction of radiation. Even the earliest attempts at the destruction of secondary nodules by x rays were often locally successful. The shrinkage and disappearance of local masses of cancer may possibly indicate nothing more than the acceleration and completion of this natural process of destruction.

The Prophylactic Use of Radium at the Time of Operation.

Having considered and rejected the idea of extending the scope of the primary operation to include removal of the supraclavicular and the anterior mediastinal glands, I determined at the end of 1919 to try another plan to meet the deplorable frequency of intercostal and supraclavicular recurrence.

If in a considerable proportion of cases, at the time they come to operation, microscopic colonies of carcinoma cells are present in these glands, it may be fairly hoped that vigorous irradiation applied to the glands as directly as possible may destroy these colonies. There is the further possibility that a general immunizing action may be at the same time secured.

Prior to the closure of the main operation wound, a 25 mg. tube of radium is pushed under the intercostal fascia at the inner end of the first space. A similar tube is placed in the same way at the inner end of the second space, and it might be advisable, if a third tube is available, to place it at the inner end of the third space. The threads attached to these tubes are brought out through the line of incision or through separate stab wounds, as may be convenient. A 50 mg. tube of radium is now introduced under the deep fascia in the lower and inner angle of the posterior triangle, the situation where the first evidence of supraclavicular recurrence is usually found. This tube is introduced through a small stab

wound. The radium is screened with 1 mm. of platinum; it is left in place for twenty-four hours and is withdrawn at the first dressing.

The following is the first case in which I used the method.

CASE XX.

A young lady of 32, six months pregnant and in vigorous general health, was brought to me in December, 1919, with a rapidly growing mastitic carcinoma of the upper and outer quadrant of the left breast. The axillary glands were enlarged. The growth was evidently very malignant, and the pregnancy as well as the youth and vigour of the patient made the outlook a bad one, but I urged an immediate operation, to be combined with the use of radium, and my advice was accepted. The pregnancy continued undisturbed, and resulted in a very fine healthy infant. Subsequently x rays were administered by Dr. Finzi. A section showed an exceedingly active and cellular growth with hardly any stroma. The patient was not permitted to suckle her child. At present (November, 1920), nearly a year later, she remains well.

This case was exactly of the type in which an early fulminating recurrence seemed inevitable, and its result to date is distinctly encouraging. I have since made the use of prophylactic radium a routine practice wherever possible. If the method establishes itself it will be necessary for surgeons dealing with breast cancer either to possess or to have access to the necessary amount of radium.

The use of radium in this way seems perfectly safe, if it is kept well away from the skin. The only drawback I have to report is that in several cases brachial neuralgia, lasting for several months, and accompanied in one case by a small trophic slough in the region of the elbow, has occurred. I shall therefore, in future, use a 25 mg. tube instead of 50 mg. in the supraclavicular triangle, and as a security against secondary radiation I propose to enclose it in a rubber sheath.

I await the results of this method with interest and hope, encouraged by the fact that no recurrence has yet taken place in any of the cases treated during the past year.

Open-air Treatment.

In conclusion, I should like to urge the importance of open-air treatment, both for its prophylactic value against recurrence and in the more chronic varieties of inoperable cancer. In cancer, as in tubercle, the natural defences of the body are to be partly found in the processes of inflammatory and fibrotic reaction. Clinical experience of the value of open air in tubercle shows that these processes are stimulated by fresh air.

ABSTRACT OF A LECTURE

ON

SUBACUTE BACTERIAL ENDOCARDITIS.*

BY

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THE subject of this lecture—subacute bacterial endocarditis—has been selected primarily because it happens to be one of those states of disease which warrants a wider recognition, and because clinical observation and experience offer abundant and ever-increasing evidence of the high rate of incidence of the condition. In spite of the mass of convincing and definite conclusions arrived at by the pioneer investigators, subacute bacterial endocarditis is a disease which is very frequently overlooked entirely. To some extent this may possibly be accounted for by the fact that the condition is one of slow and insidious onset, more often than not arising in patients already suffering from cardiac disease itself of such a nature as to explain apparently, in perfectly satisfactory fashion, any degree of cardiac failure which may be present. Valuable indications, however, later to be discussed, enable us to realize that valvular lesions, typically quiescent, may become the seat of a fresh infection which will influence profoundly the whole outlook of the patient, and materially alter the prognosis. The whole position will be simplified if we are prepared to appreciate the presence of signs of active infection in patients suffering from a hitherto quiescent lesion.

* Delivered at the National Hospital for Diseases of the Heart, November 29th, 1920.