nursing in just this way—by giving it *before* the completion of their hospital training. This, in her opinion, was the only way to offset the unfortunate drift of modern nursing towards an exaggerated institutional professionalism.

The Waltham School has proved by long experience the wisdom of this advice. It has found that after a full year of hospital training some of the pupil nurses are tired out and discouraged, while others are enamored of hospital life or of their associates. They need first a good vacation and then an entire change of service. They need an enlarged vision of life and a realization of the fact that not the individual but the family is the real human unit. They need to learn that hospital ways are not the only ways of caring for patients and that there are many other kinds of helplessness than such as hospitals admit. The Waltham School has found further that pupil nurses before they have finished their hospital service are far more teachable in home nursing than they are afterwards, when they are too apt to think they know it all. Moreover, as during their second year in the hospitals the pupil nurses serve as head nurses, and so as the immediate teachers of their juniors, the School prefers to have this as their last or finishing course. The breaking up of intense friendships and antipathies, by a few months of separation from their hospital associates, and the avoidance of placing some as head nurses over their own classmates, have been found to be of no small advantage.

It is not claimed that the hospitals prefer such an interrupted curriculum. On the contrary, they dislike it. Naturally, it would be easier for them if, in the interest of the pupil nurses, no changes whatever had to be made in their assignments to different services.

All systems of education and methods of training must be judged by their fruits. The Waltham School is perfectly willing to be so judged. Are the graduates of this school, or are they not, good nurses? Have they failed or have they succeeded as private family nurses, as district visiting nurses, as public health and industrial nurses, as teachers and superintendents of nurses, and as hospital matrons and superintendents? Are they, in short, the kind of nurses wanted by the medical profession and by the people? Are any other graduates more in demand? Have any others won higher hon-

ors? The Waltham School believes that every one of these questions can be answered only in its favor.

Original Articles

THE TREATMENT OF EARLY AND DOUBTFUL CASES OF CANCER.*

BY ROBERT B. GREENOUGH, M.D., BOSTON.

Mr. President, Members of the New Hampshire Medical Society, Ladies and Gentlemen:

I THANK you most heartily for the invitation to address this meeting of your Society on some of the aspects of the cancer problem. Cancer is, at present, one of the diseases which arouses the interest and activities of the medical profession, not only because of the increasing frequency of the disease but, also, because we recognize that the measures heretofore employed for its relief have been sadly inefficient, and year by year a greater number of our adult population, many of them in the period of life when their services are of the greatest value to the community, succumb to the disease. When we think that the chances of every individual over thirty-five years of age dying of cancer are fully as great as the risk of death in every patient sick from typhoid fever we begin to appreciate the significance of the disease.

During the past ten or fifteen years much time, energy, and money has been spent in laboratories and hospitals in the investigation of the cause of cancer. As a result of these investigations many unsettled questions have been brought to a satisfactory solution, but the main and important fact in regard to the disease—its cause—is still as much a mystery as it has ever been.

We are living at present in an era of publicity, and the cancer problem has already been exploited before the public to such an extent that in some communities, at least, the laity are better informed in regard to the disease than in the past. Some misapprehensions in regard to cancer have been corrected, and the early suspicious symptoms of cancer have been published so widely that it is believed that the patient

* Read at the annual meeting of the New Hampshire Medical Society, Concord, N. H., May 14, 1919.

comes to the physician for advice more promptly than was customary fifteen years ago. This is, undoubtedly, a step in advance, but more remains to be done along this line. The state health boards and national societies, like the American Society for the Control of Cancer, are doing what they can to popularize this information, but the work must be fostered and continued if it is to reach to any considerable proportions in the saving of human life. Especially must our medical men, those who are on the front line of the warfare against disease—the family physician—obtain a more accurate and broader view of the cancer problem, for it is only through their assistance that the increased education of the laity can be made effective. To this end the Society for the Control of Cancer has recently prepared a pamphlet for circulation among physicians, giving in a concise form a summary of our present knowledge of cancer as it appears in the different regions of the body. We call the disease “cancer” as if it were one definite disease, like malaria or typhoid fever, but its manifestations in different organs are quite as different in their characteristic symptoms as the infection of tuberculosis is different from that of anthrax or diphtheria. Even in the same organ or situation tumors of different degrees of virulence occur, such that one form may be highly malignant and rapidly fatal whereas another is of such slow progress that as a danger to life it is almost insignificant. These different types of disease must be clearly distinguished.

At the present time the only satisfactory method of treatment of cancer is its removal by a surgical operation. This is the united opinion of the medical world. There are exceptions to this as to all rules, and certain methods of treatment, such as radium, x-ray, or caustic, may reasonably be substituted for operation in the treatment of cancer of superficial type in certain limited situations. The exceptions, however, only go to prove the rule, and the reason for that rule is easy to see. The essential characteristic of cancer is that it is a disease which shows a tendency to extend from its point of origin to other regions of the body. This extension may take place by direct local infiltration, by growth along the lymphatics to the adjacent lymph nodes, by embolic dissemination through the blood stream or the lymphatic

ties, or by being scattered through the open cavities of the body. It is this characteristic of cancer rather than its appearance under the microscope that determines, finally, its degree of malignancy. Some forms of cancer are so slow in their local growth, and show so little disposition to remote metastases, that to all intents and purposes they are no more significant than would be a benign tumor, while in other cases a minute primary focus of the disease may show such rapid extension to surrounding structures and form so rapidly remote metastases that the duration of life of the unfortunate individual may be limited to a month or two, at most. The moment at which extension begins from the primary focus of disease is quite unknown to us, but we do know that in certain situations this extension occurs more rapidly than in others. Cancer of the tongue is, for instance, earlier in producing metastases in the lymph nodes of the neck than is cancer of the lip, and superficial lesions of the skin of the face may exist for years without extension beyond the limits of the local growth. The first planting of cells in the metastases, however, is of course, of only microscopic size, and it is only after those cells have had a considerable period of growth in the new situation that they produce changes capable of being appreciated by the most delicate methods of clinical examination. During this period of growth, however, other microscopic nests of cells are given the opportunity to extend over a still wider circle and to more distant regions, as the widening circles of wavelets spread out from a splash in the middle of a pond.

It is because of these well recognized and fundamental features of the growth of cancer that the operative treatment is, at present, our only certain method of protection against the disease. By the operative removal of the original tumor, together with the tissues which we recognize by experience in each situation to be the ones liable to the earliest metastatic growth, and by keeping so far outside of the malignant or suspicious tissue that we are certain that our field of operation is in normal tissue, we can remove the whole of the disease and cure the patient, and only by such complete removal of the disease can the danger of recurrence be avoided. When this is done, however, cancer can be removed from the body just as effectively as a benign tumor. It is only a

matter of the extent of the operation. Other methods of destruction of the tumor, as by cautery or by radiation, can sometimes be made effective for the superficial primary manifestations of the disease. The experience of the last few years, however, has taught us that metastatic deposits of cancer, especially squamous-celled or glandular carcinoma, involving the lymph nodes and deeper tissues of the body, are not amenable to destruction by radium or x-ray. So generally is this recognized that the removal of the regional lymph nodes by operation must be practiced even in those situations where, for one reason or another, the destruction of the original superficial lesion by radium or x-ray is attempted.

As a result of an enormous amount of study of the different forms of cancer, operations for the radical cure of the disease in different situations have been elaborated, and virtually standardized. By this I mean that the pathology, the degree and extent of local extension by infiltration, and the probability, location, and extent of glandular or more remote metastasis, have been studied out for cancer in all of its more common situations. As a result of this study we find that, as a rule, the tissues must be removed *en bloc* in order that the entire process—the primary lesion and the regional extensions—may be circumscribed without cutting into any suspicious tissues and thus running the risk of contamination of the wound. Whether the operation is done in Maine or California, the tissues removed in each individual region are practically the same. Different methods of approach, of course, exist, according to the fancy or experience of the individual operator, but the operation for cancer of the lip, or tongue, or breast, is practically standardized for cases which can be recognized as cancer, and which are not already beyond the possibilities of cure by radical operation. It is not necessary here to go more fully into the technique of these standardized operations for cancer in different organs, but we must make use of the fact that operations for recognized cancer have been standardized in the discussion of the appropriate procedure in dealing with early and suspected cases where a positive diagnosis cannot always be established. The fact should be emphasized, also, that the standardization of these operations has resulted from the accumulated experience of surgeons and pathologists

throughout the world, which has determined very definitely the anatomical areas which are to be suspected of involvement by extension from the original focus of the disease for each situation and for each type of malignant tumor which may occur. It is with due regard to these facts that we must base our conduct in the early and doubtful cases in order that we may be consistent, and, especially, in order that we may preserve to the individual patient his best chance for the radical cure of his disease.

It is a trite but essentially truthful statement that the definite and recognizable "text-book" symptoms of cancer are those of cancer which is no longer in its early stages. The accumulated experience of years has shown us that the more positive the clinical diagnosis the more advanced the disease, and the less the probability of cure by operation, and too often the policy of waiting for symptoms which will permit a positive diagnosis results in depriving the patient of her only chance of cure of the disease. Delay in this respect is fatal, and, yet, the situation that confronts us all in dealing with early and doubtful or suspicious cases is one to tax our resources to the utmost. If we are to make material advance upon our present most unsatisfactory results, the waiting method must be abandoned, and safer methods made available. This at once brings up for consideration the exploratory operation. The exploratory operation, however, has in it great possibilities of danger when considered from the point of view of the standard radical operation. When we are dealing with those forms of cancer which involve serious operative risk and grave mutilation if radical cure is to be attempted, as in cases of cancer of the tongue and jaw, or cancer of the uterus, the indications for that serious operation require, both for the sake of the patient and for the sake of the surgeon, a diagnosis better substantiated than merely the suspicion of the disease. In these cases, therefore, the aid of the pathologist must be obtained. In order to obtain this positive diagnosis, however, we must be extremely careful to avoid, in any operative procedure we may undertake, going counter to the fundamental principles of radical operation, namely: to remove *en bloc* the whole of the disease, and to protect the patient from local implantation of the disease.

The removal of a fragment of tissue for examination by the pathologist is commonly spok-

en of as biopsy. If a fragment could be removed without opening up fresh tissue to the immediate spread of the disease, a biopsy would be, of course, the most certain and satisfactory method of procuring a positive diagnosis. When we are dealing with lesions on the surface of the body, and especially those which have already undergone ulceration, and are, therefore, surrounded by more or less of a barrier of inflammatory tissue, this procedure may, perhaps, be justified. When we are dealing with deep tumors, however, as in cases of cancer of the breast, cutting into a tumor for the removal of a fragment for diagnosis, and closing the wound to wait perhaps for a period of seven to ten days for the report of the pathologist, virtually destroys the patient's chance that the disease may ultimately be eradicated. In my own experience, where this has been done in cases of cancer of the breast, I have never seen a subsequent operation for the radical cure of the disease result successfully, and in the experience of many other surgeons this method has been followed by almost as uniformly bad results.

The question, therefore, comes as to how we can obtain the pathological specimen that we want for diagnosis without running the risk of spreading the disease. I believe that our safest method is the employment of the cautery to excise a fragment of tissue suspected of malignancy. We thus seal up at once the lymph spaces and blood vessels, and protect the patient from the artificial spread of the disease. The fragment thus obtained can be examined immediately for frozen section diagnosis and further procedure can be based upon the pathologist's report. If the disease is malignant the radical operation is performed at once; if the disease is non-malignant the cauterized tissues can be cleanly excised with the knife, and the wound closed exactly as if the cautery had never been employed. In my opinion the cautery knife is the safest method of removing tissue for examination, and one that I believe should be much more widely employed. *No cutting into cancer tissue with either knife or cautery, however, is to be advised if the diagnosis can possibly be established, by the clinical symptoms, beyond reasonable doubt.*

When it comes to the early diagnosis of actual cancer the disease must be considered in each of its locations, and the differential diag-

nosis of the disease in that situation must be carefully worked out. The various non-malignant lesions which may resemble cancer in one situation, as the lip, differ materially from the lesions which may be mistaken for cancer in some other situation, as the uterus or the breast. In each situation, however, cases are bound to arise in which the best efforts of the physician fail to establish a positive diagnosis. How is this difficulty to be surmounted? There is no single or universal answer to this question, because of the protean character of cancer in its different situations. For each organ or situation a method of procedure must be evolved which shall safeguard the patient's possibility of cure of the disease while permitting a positive diagnosis, and, if necessary, the appropriate radical operation. Two years ago, when the subject of exploratory operations in cancer was under general discussion, I published a report upon this subject* based upon the replies received from one hundred and thirty-four physicians and surgeons, members of the American Surgical Association, the Clinical Surgical Society, the American Gynaecological Association, and the American Association for Cancer Research. There was some diversity of opinion, and some surgeons were frankly and positively opposed to the exploratory incision into cancer tissue under any circumstances. The majority view, however, was that exploratory operation was occasionally necessary, and that when necessary it should be performed in such a way as to endanger as little as possible the patient's chance of subsequent radical cure. As a result of this expression of opinion the appropriate procedure for each situation was determined, and since that time many of us have attempted to follow closely the suggestions thereby laid down. After two years' trial of these suggestions it is my belief that the procedure may be somewhat simplified. There are three main groups of cases of cancer, in each of which a different method of procedure appears to be appropriate when the positive diagnosis of cancer cannot be established by clinical symptoms alone. These groups are as follows:

GROUP 1. Small superficial ulcerated lesions of the skin and marginal mucous membranes. In such cases the clean excision of the whole lesion by a wide margin, *immediate frozen sec-*

*"The Handling of Early and Doubtful Cases of Cancer," by R. B. Greenough, M.D. *Annals of Surgery*, October, 1917.

tion diagnosis, and the *immediate* completion of the radical operation if cancer is present, is the method to be pursued.

A man of fifty-six presents himself with an indurated shallow ulceration, one-quarter inch in diameter, on the margin of the tongue, of six weeks duration. He gives a history of syphilis. There is a jagged tooth projecting from the lower jaw opposite to this ulceration. There is slight enlargement of a lymph node in the submaxillary region of the affected side. In such a case the differential diagnosis demands that we consider syphilis, tuberculosis, simple ulcer, and carcinoma. A Wassermann is found to be negative. There is no evidence of tuberculosis elsewhere in the body. What procedure shall we recommend in such a case? Syphilis, even if shown to be present, does not rule out the possibility of cancer, for syphilis is a frequent background for the development of cancer in the mouth. We cannot wait with safety for the so-called "therapeutic" test. The absence of tuberculosis elsewhere and the relatively slight glandular involvement make tuberculosis an extremely improbable diagnosis. The presence of the jagged tooth may account for the beginning of the ulceration, but we have learned to dread the development of malignant disease in such an ulceration, and the delay would be unsafe if we relied upon a diagnosis of a benign lesion and waited for it to heal after removal of the jagged tooth. If cancer of the tongue exists it is in a relatively early stage. I have no hesitation, therefore, in advising that this situation should be met by the operative removal, through the mouth, of the affected portion of the tongue. A margin of about three-quarters of an inch about the induration should be taken out, and the defect of the tongue closed by drawing the remaining surfaces together. This tissue can then be subjected to immediate pathological examination by frozen section, a positive diagnosis established, and the radical operation, if shown to be necessary, performed at one sitting. The two-stage operation is commonly advised by some surgeons in cases of cancer of the tongue and mouth, on account of the serious danger of infection of the mediastinum in the one-stage operation. In general, however, the complete radical operation should all be done at one sitting if possible. If the diagnosis proves not to be cancer but syphilis, tuberculosis, or simply a chronic ulcer, the radi-

cal removal of the lesion from the tongue is altogether justified by the immediate cure of the disease and the removal of the danger of subsequent malignant change.

The forms of cancer which fall into Group 1 are as follows: Early and small doubtful lesions which are suspicious of cancer of the lip, the tongue and mouth, the external skin, the vulva and vagina, the uterus and the rectum. In all of these situations I believe an exploratory excision is permissible in a doubtful case, provided it is done with all the resources for a frozen section diagnosis available, and with the understanding that the radical operation is to be completed at once if the pathological report confirms the suspicion of cancer. It will be seen that dependence is placed upon the fact that the early and doubtful case is one with only a small local lesion, and lacking the characteristic symptoms of malignant growth, such as local infiltration and fixation, and extension to regional lymph nodes. Where the local lesion is larger the diagnosis is not, as a rule, uncertain. In such cases, however, occasionally doubt will exist, and if an exploration is required reliance must be placed upon the barrier of inflammatory tissue about the ulceration; some of the central portion of the ulcer should be removed with the actual cautery. The "growing edge" of the ulceration, however, should never be cut across, lest the rapid dissemination of cancer cells defeat the purpose of the operation.

GROUP 2. Exploratory operation in cases of Group 2 is attended by more difficulty and greater risk than in Group 1. Group 2 includes deeply situated tumors, such as cancer of the breast, and many varieties of sarcoma, including sarcoma of bone. It is in these deeply situated tumors, especially, that danger of local contamination of the wound by incision into suspected tissue exists. In such cases the cautery is our best resource. An illustrative case is as follows.

Nine months after delivery, and three months after weaning the child, a woman of twenty-seven presents herself with the following conditions. The breast is somewhat smaller than on the unaffected side; there is a mass in the upper outer quadrant, stony hard, adherent to the skin, and with dilated blood vessels above it; the nipple is retracted, and there is enlargement of the axillary glands. There is no pain or tenderness in the tumor or in the glands. These

symptoms must be considered extremely suspicious of cancer of the breast. On account of the recent history of lactation, the presence of milk in the breast on the unaffected side, and the youth of the patient, the probability of a chronic abscess of the breast was considered sufficient to justify an exploratory rather than a radical operation. This operation was performed under ether, as follows: An incision with the knife was made through the skin and subcutaneous tissues above the tumor, and running toward the axilla. The margins of this incision were held apart, and the breast tissue was divided in a line radiating from the nipple, with the electric cautery. After traversing a half inch of normal breast tissue dense scar tissue was encountered, which resembled, closely, carcinoma. A fragment of this tissue was removed with the cautery, but immediate frozen section diagnosis showed no evidence of malignancy. Further exploration with the cautery then opened a cavity containing about two drachms of thick pus. A diagnosis of chronic abscess was thus established, and the possibility of malignant disease ruled out. The cautery was then abandoned; the affected quadrant of the breast, including all of the cauterized tissue and the abscess, was excised in a triangular piece, coming to a point at the nipple. The clean edges of this wound in the breast tissue were lightly sutured with catgut, a drain was placed beneath the breast, and the incision was closed. By this means the functional value of the breast for a future lactation was preserved, and, yet, if cancer had been disclosed by the exploration the radical operation could have been immediately done without fear of local contamination of the wound.

When dealing with sarcoma and other deep-lying tumors which can only be exposed by the dissection of several layers of normal tissue above the tumor, the use of the cautery, as in the case of chronic abscess of the breast, is our best protection. Tissue can be excised and removed for examination with the cautery with a minimum of danger of spread of the disease. In any case, however, the completion of the operation under one anaesthesia is much to be preferred to the delay and danger attending a two-stage operation.

GROUP 3. This group of cases includes the suspicious tumors of organs in which exploratory incision into the tissue is unnecessary be-

cause the operation for cancer and the operation for the cure of any of the lesions which may be mistaken for cancer is practically the same—namely: removal of the whole organ.

In this class of cases fall cancer of the stomach and intestine, gall bladder, the kidney, the prostate, ovary and testicle. An illustrative case is that of a patient of fifty presenting symptoms of long standing ulcer of the stomach. X-ray examination shows a constant defect with loss of mobility at the pylorus, and a moderate degree of stasis. An exploratory operation reveals a mass the size of a golf ball at the pylorus, with dilatation of the stomach. There is slight enlargement of the lymph nodes in the region of the pylorus but no evidence of disease in the liver. The clinical diagnosis between cancer and ulcer of the stomach, even at operation, is recognized to be extremely difficult. The best operative treatment in such a case is, undoubtedly, a pylorotomy. By this operation the patient stands a chance for radical cure of the disease if it is cancer. If not, he is cured of his gastric ulcer and relieved of the danger of its subsequent malignant change. Even tumors of the testicle justify, I think, this radical treatment, although we recognize that syphilis is one of the conditions with which testicular tumors may be confused.

During the past ten years the view has been gaining ground that chronic irritation is an element of serious importance in the etiology of cancer. This has long been recognized in certain situations, as, for instance, when cancer finally develops in the margin of a chronic ulcer of the leg or at the situation of a long standing ulceration in the mouth. Of late, however, this predisposition of chronically irritated or ulcerated surfaces to become malignant has been recognized more widely, and a certain number of lesions, in themselves essentially benign, are spoken of as "pre-cancerous" diseases. In this category fall the pigmented moles, keratoses, leukoplakia, chronic fissures and ulceration of the marginal mucous membranes, erosions and lacerations of the cervix, the involution changes of the breast, uterus and prostate, and many benign tumors, both of epithelial and connective tissue origin, which show a disposition to malignant change with advancing years. To this group of diseases real prophylactic treatment against the occurrence of cancer can be applied. The removal of these minor lesions, often under

local anaesthesia, relieves the patient of the danger of malignant change at some future period of time. The destruction of these lesions even by radium and x-ray, if it is complete, is often sufficient to cure the lesion and to remove the danger of subsequent malignancy. In general, however, operative removal is to be preferred to radiation for two reasons: First, the complete removal or destruction of the diseased tissue must be accomplished, and this is procured with greater certainty by operation than when radiation is employed. Anything less than destruction, and anything remotely approaching additional irritation is strenuously to be avoided lest the tendency to malignant change be hastened by the increased activity of growth, which in certain cases appears to follow the incomplete destruction of tissue by radiation. In the second place, removal of the suspected area of the "pre-cancerous" lesion by operation makes possible the pathological examination of the tissue removed, and thus provides a safeguard in confirming or checking up the correctness of the original diagnosis and provides opportunity for performing at once the more extensive radical operation in case the disease is shown to have progressed already from the "pre-cancerous" to the cancer stage. In this connection the institution of a free diagnosis service is a measure of the greatest usefulness. Such a service has now been in operation in Massachusetts for nearly two years, and the specimens coming in at present at the rate of one hundred or more a month, serve to indicate how much appreciated such a service may be even in a community well supplied with hospitals and pathological laboratories. It is probable that the local excision of the lesions which are recognized to be of "pre-cancerous" significance is one of the most effective measures at present available to combat the widespread and increasing incidence of cancer.

To sum up, briefly, the essential points of this communication I would state the facts as follows:

1. The radical operation for the cure of cancer must be performed at an earlier stage than at present if material improvement in the results is to be attained.

2. The diagnosis of early cases of cancer cannot always be made by the typical clinical symptoms, and must be, to some extent, depend-

ent upon exploratory operation and immediate frozen section pathological examination of the tissue.

3. The removal of tissue for pathological diagnosis must be done in such a way as not to cause local implantation or spread of the disease and thus imperil the patient's chances of cure by radical operation.

4. Operations for the radical cure of cancer in different situations have been standardized.

5. Operations for exploration of suspicious but doubtful cases of cancer in different situations may also be standardized.

6. For this purpose three groups of cases may be recognized.

7. Group 1. Small and early ulcerative lesions of the skin and superficial tissues and the marginal mucous membranes: Lip, tongue, mouth, vulva, vagina, uterus and rectum. Such lesions should be excised with a broad margin of healthy tissue and subjected at once to frozen section examination. If cancer is demonstrated, the radical operation should be completed at once under the same anaesthesia. In doubtful lesions, which are large and ulcerated, a fragment may be removed with the electric cautery from the central portion of the lesion, but this measure should be employed only when absolutely necessary.

8. Group 2. Carcinoma of breast, sarcoma and carcinoma and other non-ulcerative malignant tumors of the deeper tissues. The cautery should be used in preference to the knife for exploration and for excision of tissue for immediate pathological examination. The radical operation should be performed at once, under the same anaesthesia, if cancer is found to be present. Delay in waiting seven to ten days for a pathologist's report is likely to be fatal to the patient's chances for a radical cure.

9. Group 3. Carcinoma of the stomach, colon, gall bladder, kidney, prostate, ovary and testicle. In these situations no exploratory incision into cancer tissue is necessary or advisable. The radical operation will be performed in any case.

10. "Pre-cancerous" lesions, not yet showing evidence of malignancy, should be removed by the knife in preference to radiation or the cautery, and the tissues should be subjected to pathological examination.