

Original Articles.

THE DIAGNOSIS AND TREATMENT OF
CANCER OF THE BREAST.¹

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THE great changes which have recently taken place in the treatment of this formidable disease have invested it with a new interest, and it has therefore seemed to me that the subject of this paper was as appropriate a one as could be presented to your society by the general surgeon. Until within the present decade the success which has attended operative interference has been so unsatisfactory that many surgeons, among whom I should count myself, had become discouraged, and had chiefly confined themselves to operations upon exceptionally favorable cases, or to those which demanded operative interference for the relief of suffering merely.

The old method of operating contemplated either a removal of the mammary gland with a portion of the integument, or even of a portion only of the gland and other tissues immediately surrounding the disease. When enlarged glands were felt in the axilla an incision was prolonged from the wound a short distance beyond the border of the pectoralis muscle, and the glands were shelled out with the finger or some blunt instrument. It was in rare instances only that more radical operations were attempted. The bold methods advocated by Mitchell, Banks, Keuster, Gross and others are now in course of adoption by the surgical world, and a new mass of statistics is gradually being accumulated which is rapidly furnishing material for reopening the study of this question.

It is important to lay some stress upon the kind of material that should be used for this purpose, for recent discussion has brought out very decided opinions from men whose views should be regarded with the greatest respect, but who are not disposed to look upon the so-called "completed operation" as an advance upon the older methods.

There are good grounds for rejecting the great mass of statistics which have been compiled previous to the present decade.

In the first place, microscopic examinations are wanting in the majority of cases, and many of those which have found their way into reports of cases have not been reliable. Not only have some cases reported as carcinoma proved on further study to belong to non-malignant growths, but there are also types of disease regarded as forms of inflammatory affections of this organ in which the experienced pathologist is able to detect early changes in the growth of the epithelial structures, which are the first steps in the development of a carcinoma.

Again, although the antiseptic treatment of wounds was first introduced nearly a generation ago, it is only within a few years that the system has become so generally perfected that the average surgeon has been able to arrive at the results contemplated by its author. Each succeeding year brings with it a material improvement in mortality

statistics, and it would be manifestly unjust to estimate the amount of danger and suffering entailed upon a patient subjected to the operation from material which has been collected previous to the last few years.

The advocates of the completed operations are now laboring under the same difficulties in educating the surgical public up to their standard of operation, precise rules for which are rigorously laid down, and which should be closely adhered to by those attempting to give the new method a proper test. When these conditions shall have become so familiar to all surgeons that cancer will be recognized during the earliest periods of existence, that the diagnosis will be promptly followed by an operation, that the operation will be so thorough in character that it will come up to the most exacting standard, and that the patient may reasonably expect the full benefits of the antiseptic system, there will, I think, be but little doubt that the very unfavorable prognosis now generally accorded to this disease will have to be materially modified. Let us consider first what may be done in the way of an early diagnosis.

When a woman of middle age presents herself with an indurated mass in the mammary gland, which has already involved the skin, and there exists at the same time a retraction of the nipple, and possibly a slight fulness of the axilla of the same side, the diagnosis is so clear that a tyro would find it hard to make a mistake. The problem, however, is far more difficult, and often embarrassing, when an anxious woman has only an indurated spot in the breast to show, and expects the surgical expert to give a definite opinion. There are a few facts bearing upon the etiology of this disease which it is well to bear in mind in making up an opinion.

Among the most important of these is the age of the patient: according to Gross² "the largest number in 1622 cases in which the age of the patient was noted was found to be between forty and fifty years, the next largest number was found between fifty and sixty years, the next in the thirties, and the next in the sixties. The earliest age at which cancer of the breast was reported is given by Henry as twenty-one. Very few cases are seen before the age of twenty-five. A case under my care at present in the hospital is that of a girl of twenty-two, and owing to its rarity deserves record here.

Lizzie M., twenty-two years six months old. Born in Boston. No cancer in her family, so far as known. Previous history good, unmarried. Catamenia regular. Presented herself at the Massachusetts Hospital, January 25, 1889. Three months before noticed a lump in the left breast, and almost at the same time a gland in the axilla. She is well developed and nourished. In the upper and outer quadrant of the left breast there is an indurated mass the size of an English walnut. There is no involvement of the skin, but a slight dimpling exists. No retraction of nipple. There are some enlarged glands above the clavicle, but these are said to have existed for a long time previous to any breast-disease.

The completed operation was performed January 26th. The glands did not extend upward beyond the lower margin of the pectoralis minor. There was considerable shock, that night the temperature falling to 95.8°. Pulse, 120; respiration, 48. Prompt retraction took place, however, and the convalescence has been rapid and without further complications. Suppuration around one entire and opening of the wound at that point; otherwise union by first intention. Microscopic examination of tumor by Dr. Whitney. "A dense, somewhat translucent, retracting nodule deep in the breast. A section presented a whitish, fibrous-looking surface, with mucous, small opaque yellow dots and lines. Microscopic examination showed it to be made up of a thick, dense, small-meshed, connective-tissue groundwork, in the spaces of which were solid masses of rather small, cubical, epithelial cells, many of which were fatty degenerated. Scirrhus cancer.

Another sign of value is the locality of the tumor,

¹ Read before the Boston Gynecological Society, February 14, 1889.

² American Journal Medical Sciences, April, 1888.

if we may accept again the testimony of Gross. In 820 cases, the disease was found in the upper and outer quadrant in 206, near the nipple in 235, and in the upper hemisphere twice as often as in the lower hemisphere. Speaking from general impression only, I should be inclined to agree with the deductions made from these figures, namely, that we are more likely to find the disease in the upper portion of the gland, and more likely also to find it nearer the axillary than the sternal margin of the gland.

The influence of heredity has often been quoted as a characteristic peculiarity of cancer. Sir James Paget has cited a number of remarkable instances of the disease occurring among relatives. An example of this tendency was afforded by one of my own cases. Her maternal grandmother died of cancer of both breasts, at the age of thirty. A maternal aunt died of cancer of the breast. A cousin on her mother's side died of cancer of the rectum. An aunt on the father's side was operated upon recently at the Massachusetts General Hospital for a cancer of the breast. But Gross found a family history of cancer in only 8.50 per cent. of his cases.

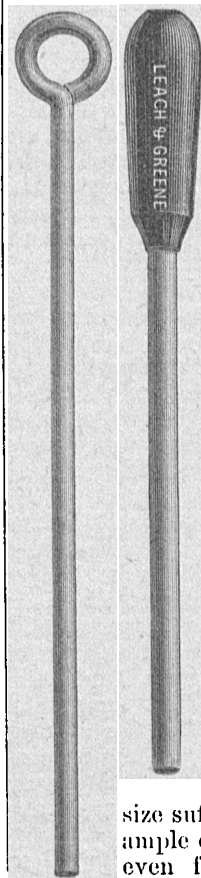
An undoubted record of the prevalence of cancer in a family would, I think, have considerable weight in enabling one to make a diagnosis in a doubtful case. The difficulty in obtaining a record which would approach in accuracy the standard now demanded as evidence of the existence of cancer would be almost an insuperable obstacle. The information ordinarily to be obtained from a patient bearing upon this point is practically of little value.

A slight dimpling of the skin is thought by Gross to be a sign of considerable importance, as one which is to be found at an early stage of the disease. This is due to a pulling upon the fibrous bands which attach the skin to the mammary gland, by the contraction of the diseased portion. I have seen this depression in cases in which I made the diagnosis of chronic mastitis, and there seems to me to be no ground for assuming that an inflammatory condition of the mammary tissue in a state of involution should not give rise to such an appearance. In fact, we may have all the external appearances of cancer of this organ simulated by inflammation. A striking illustration of this fact was observed by me in the breast of the wife of a brother practitioner. In this case there existed, in addition to an indurated nodule in the outer hemisphere of the breast, a retraction of the nipple and an enlargement of the axillary glands. The nodule proved, however, to be inflammatory, and disappeared entirely a few months afterwards; and the patient at the present time, several years after the disappearance of the swelling, is in excellent health. Retraction of the nipple is indeed often a misleading symptom; for it is not infrequently found in breasts that are entirely healthy.

Many of the cases submitted to the surgical specialist are therefore, as I have said, extremely difficult to diagnose in the early stages of the disease; and yet this is the period which is generally recognized as the one in which diagnosis is of great value. A striking example of the difficulties which attend such a case is afforded by a patient sent to me in March, 1888, by Dr. Brown, of Reading, Mass.

Mrs. P., forty-five years of age, received a blow from a sharp object eight weeks before. The blow was immediately followed by a swelling below the nipple, at the point of injury. In a few weeks the swelling had diminished somewhat, but a small indurated mass was still to be felt at that point. There was no dimpling of the skin, and no enlargement of the glands in the axilla. The patient's general health was good. The growth appeared to be of an inflammatory nature. I advised her to let me see it again in a few weeks. She visited me a second time, on May 19th, and the breast was then found to be entirely infiltrated with cancerous disease, presenting a hard, brawny mass; the glands in the axilla were also considerably enlarged. I then, of course, recognized a very malignant type of cancer, and advised no operative interference. She received similar advice from several other surgeons, but eventually had it drawn out "by caustic;" and Dr. Brown informs me that she died December 11th. It is probable that operative interference at any period would not be attended with satisfactory results in such a malignant type of the disease, but it would certainly be more creditable to surgery were it possible to give a definite diagnosis in doubtful cases, for it is in precisely such a class of cases that the surgeon is most likely to be consulted.

An old method of ascertaining the nature of morbid growths consisted in the introduction of a grooved needle into the tumor, and submitting to microscopic examination such fragments or juices as could be extracted. Quite a variety of instruments were devised for this purpose, but owing to the danger of producing inflammation by such a manœuvre, unprotected by antiseptic methods, and to the imperfect microscopic technic, which consisted principally in poking the fragments apart with needles, no satisfactory results were obtained, and the method gradually fell into disuse.



It occurred to me about a year ago that this plan might be revived under the favorable auspices of antiseptics, and perfected by the improved microscopical methods. An instrument devised by Dr. S. J. Mixer for removing grains of powder from the skin was suggested by him as suitable for the purpose. It consists in a fine cannula (No. 6 Charrière filière), sharpened on the inner edge, which, when rotated by means of a handle at its upper end, acts like a trephine to remove a minute circular disk of skin. I have had a number of different sizes made, gradually enlarging them as experiment showed the absence of unfavorable results attending their use, until I have reached as high as Charrière's No. 12. This gives a diameter of about 4 mm., — a size sufficiently large to take a section of ample dimensions for microscopic study, even from a transverse section of the

fragment removed. A small staff is kept within the canula to protect the cutting edge when not in use, and to remove the specimen from the canula.

The method of making an examination with this little instrument is so simple that it can be easily carried out in one's office. A few drops (about ten) of a five per cent. solution of cocaine is injected subcutaneously over the nodule to be examined. The skin, having been carefully cleansed with a weak solution of bichloride of mercury, is punctured with a sharp-pointed bistoury, making a minute wound, sufficiently large to introduce the exploring canula. The instrument is then pressed gently against the new growth, and lightly rotated between the thumb and middle finger. As little pressure should be exerted as possible. After the canula has penetrated the growth the desired distance, from half an inch to two inches, it should be withdrawn a distance of two or three mm., and then directed in a line slightly oblique to the direction which it had first taken. By rotating now a short distance in the new direction, the cylindrical mass of tissue contained within the canula will be divided, and can be removed from the diseased mass. The worm-like mass of tissue pressed out from the canula by its staff should be immediately placed in a weak solution of alcohol, which gives place the following day to strong alcohol; or it can be placed upon the freezing microtome, and longitudinal sections be taken for immediate study.

When the canula is carefully introduced, a segment of the tumor can be obtained showing the various appearances from the extreme periphery to the central portions, so that there is no danger of obtaining a false impression owing to a partial examination only of the growth.

In one of the first cases in which I employed this method the growth proved to be a chronic mastitis, with cystic degeneration. The section showed clearly the interstitial fibrous tissue, with acini and ducts of the glands supported in it. In this case there was great mental depression and nervousness, which by a definite diagnosis it was possible to relieve.

The following is a sample case, showing what may be accomplished by the method:—

Miss C., fifty years of age, always healthy, has had for several years a small lump near the axillary margin of the left breast. Six months previously, had noticed a slight enlargement, since when it has been under the observation of her physician. As it did not disappear, she was sent to me. I used the finest canula (No. 6), and sent the specimen to Dr. Whitney for examination. An examination of a fragment in the fresh state showed clumps of epithelial cells floating in some of the fluid serum removed, and the diagnosis of cancer was made, which was confirmed after removal of the breast.

When the larger canulae are used, the alveolar structure can easily be demonstrated.

In the case just mentioned the little wound made by the knife was covered with antiseptic cotton, and sealed with collodion, and at the time of the next visit of the patient the wound was found to have been healed by first intention. Prompt healing of the wound has always been the result in those cases hitherto examined in this way, and the patients have complained of no particular pain or inflammation as the result of the operation. In one case a small artery was wounded; but healing took place promptly afterwards. The boring of the canula through the dense morbid tissue might be supposed

to cause some pain; but this is avoided by the gentle rotary motion of the instrument. I have succeeded in making a diagnosis in a large variety of morbid growths explored in this way, in doubtful cases.

There is a certain type of this disease in which an early diagnosis is of special advantage, as an operation at this period affords a favorable prospect for a radical cure. I refer to those cases where the disease appears to supervene upon a chronic inflammatory process, and the mass can be removed while the cancerous degeneration is still limited to the inflamed nodule. Such a case is the following:—

Miss W., fifty years of age, sent to me by Dr. F. I. Knight, had noticed an indurated lump in the upper hemisphere of the right breast, six months previously. It had not increased in size since that time. No glands were felt in the axilla. I advised an operation without previous exploration. On laying open the breast, the appearances were so suggestive of a chronic mastitis that I thought I had made an incorrect diagnosis, and did not open the axilla.

The following is the report made by Dr. Whitney of the microscopic examination:—

"The whole gland is replaced by a dense white tissue, in which were several cavities, the largest as big as a robin's egg. These were lined with a smooth membrane, and had evidently contained fluid. On microscopic examination, the basis of the growth was found to be composed of a dense fibrous tissue. In this were embedded the altered glandular elements. In places, the ducts were dilated, evidently the origin of the large cysts seen in the gross. Here and there the acini of the gland were reduced in size, and the cells smaller, as if undergoing atrophy. In other places the cells had proliferated and extended widely from their original place in a plexiform network into the surrounding tissue. In places these lines of cells appeared to follow the course of the lymphatics. Here and there a compound granular cell was seen, but in general comparatively little fatty degeneration. The growth seems to be a diffuse, interstitial fibroma, in which the gland elements are now beginning to proliferate actively. Commencing cancer."

Although no dissection of the axilla was made in this case, I have expressed a very favorable prognosis, as it seems to me that the very early stage of development of a cancer precludes the possibility of infection beyond the point of inflammation.

And this brings me to another branch of our subject, namely, the question of the local origin of the disease.

There are some very high authorities in favor of the view that, although not necessarily a blood disease, it is not, on the other hand, purely of local origin. Such is, I think, the inference to be drawn from the attitude assumed by Dr. R. M. Hodges in his recent paper upon excision of the breast,³ which has, I need not say, excited much interest. Sir James Paget says: "Once formed, the secondary diseases and much of all that follows, even to the inevitable end, may be due to transference of cancerous materials from the primary growths. But I do not think that all the secondary and yet later events can thus be explained. We have no reason for believing that the morbid material of the blood is always exhausted in the formation of the primary cancer, and it seems more probable that in some form this material remains or is renewed, and that to this, as well as to transference from the primary disease, the secondary and later changes are to be ascribed."

There are many cases which give grounds for such a belief. Thus, cases reported by Dr. Gouley⁴ of excision of the breast for scirrhus cancer, with recurrence twenty, twenty-four, and twenty-five years after operation, are suggestive of more than purely local influences. But without attempting to offer elaborate evidence *pro* or *con* bearing upon this question, I must enroll myself with those who believe in the purely local origin of cancer. A familiarity with the habitual progress of the disease

³ Boston Medical and Surgical Journal, Nov. 20, 1888.

⁴ New York Medical Journal, Oct. 13, 1888.

from one anatomical structure to another; the steadily diminishing size of the cancerous deposits as we proceed from the periphery towards the centre of the lymphatic system; the analogy between the manifestations of this and other forms of disease whose local origin is well recognized,—are all so strongly suggestive of a local origin, that it is difficult in the light of modern pathology to accept any other interpretation.

It seems to me, therefore, that with the benefits accruing from the opportunity to make an early and certain diagnosis, if we undertake to remove, not only the tangible evidences of disease, but all those structures which experience shows are habitually involved at a comparatively early date, we have a right to hope for more satisfactory results than have hitherto been obtained.

Let us have a mutual understanding as to the essentials of the so-called completed operation. Surgeons differ somewhat as to the amount of breast integument that should be removed. The followers of Gross, who makes a circular sweep of the whole breast, are comparatively few, and even he now proposes to abandon it in cases which he can keep under observation, and thus be enabled to remove promptly recurrent nodules. Butlin, whose work on the operative treatment of malignant disease has attracted so much attention lately, does not think necessary even to remove all of the mammary gland, although he does attach importance to the inclusion of a wider margin of integuments than the old operations contemplated. It is generally agreed at present, I think, to remove the whole gland and a more liberal supply of integument than formerly. Sometimes vertical incisions are preferred to the customary horizontal cuts, as affording better drainage. But the most important feature of this part of the new operation is the careful dissection of the fascia from the pectoral muscle, for it is in this tissue that capillary lymphatics are concealed, which furnish hiding-places for the outposts of the disease. Careful attention should also be paid to the margin of the pectoral muscle: not only should the fascia which covers in the axilla be dissected off from it, but its lower border should be well freed from fat and connective tissue. The axilla is best opened by a cut through the skin along the edge of the pectoralis, until we come to the edge of the coraco-brachialis. Continuing down on this muscle a short distance with the knife, the skin and superficial fat drop away sufficiently to disclose the great vessels lying beneath a thin fascia. Opening this fascia backward along the line we have come exposes the contents of the axilla, and especially the branches of the vessels, which can now be secured as the operation progresses. A pyramidal mass of fat is now dissected out, the apex reaching sometimes to the clavicle, the base frequently extending deeply on to the subscapular group of muscles. The glands which lie near the clavicle will have to be removed separately, and can best be enucleated from the neighborhood of the vessels by the finger. If they are numerous, the pectoralis can be separated on the line selected for the ligature of the axillary artery below the clavicle, and the glands and some of the loose tissue can then be readily removed. This plan I recently employed in the case of a lady fifty years of age. The wound

healed without complications, and the patient made a rapid convalescence.

This operation is doubtless far more severe than any of the old methods; but under careful antiseptic precautions, which are constantly being improved, I cannot help feeling that the mortality rate is now on a descending curve. Dr. M. H. Richardson,⁵ in his paper on the results of this operation, is inclined to think that the mortality is increased 50 per cent. by the new method. This impression was obtained, I think, from a study of some of the earlier series of the "completed operations." It is also Butlin's opinion. As the increased mortality rate has been used as an argument against the completed operations, I have taken pains to look up the results of my own operations within the last few years, and find that, in forty-seven consecutive cases of excision of the breast, there have been no deaths. In thirty-two cases only of these was there a dissection of the axilla. The duration of convalescence is much shortened, and complications are rare. Shock is a complication to be guarded against always, but in comparatively few cases has this been of sufficient gravity to cause alarm. I am inclined to think powerful antiseptic drugs have been responsible for more than one case of fatal poisoning before the proper limit of their use was generally understood.

A more minute knowledge of the actual course of the disease through the lymphatic vessels, which ramify along the border of the pectoralis and in the axillary region, may enable us to curtail materially the present wide range of dissection. Here is a field for future research.

Sir Spencer Wells⁶ has shown, from Dr. Creighton's observations, that tumors of the sweat glands of the axilla may form nodules on the axillary margin of the breast and in the axilla. In these cases the disease has no connection necessarily with the mammary gland, and the breast need not be removed. The study of the pathology of this region, in spite of many valuable works, cannot as yet be considered as exhausted.

In 605 cases collected by Butlin, the mortality was 15.85 per cent., or 1 in 6. Cheyne reports 37 of Lister's cases, with 2 deaths. In 24 of these cases the axilla was dissected. In Butlin's 40 cases there were 3 deaths. Butlin thinks that the mortality of the completed operation is twice as great as that when the breast alone is removed. Gross makes out a mortality of 14.24 per cent. for all kinds of operations. In 43 completed operations performed by himself, there were only 2 deaths; 1 from fat embolism, and 1 from pneumonia. In 10 additional operations by his colleagues, recovery took place in every instance. The mortality in this series was therefore only 3.7 per cent.

In regard to the number of cures effected by operative treatment, the percentage figures seem discouragingly small; but when we remember that in old times a case of permanent cure was regarded as a surgical curiosity, it must be acknowledged, I think, that a tangible improvement has taken place. Gross obtained from his collections a percentage of 11.83, when the patient was alive and well three years after operation. As in only 2 per cent. of

⁵ Boston Medical and Surgical Journal, August 30, 1888.

⁶ Morton Lecture on Cancer and Cancerous Diseases. London: J. & A. Churchill, 1888.

cases did recurrence take place after three years of immunity, this limit has been accepted as an indication of cure. Butlin thinks the percentage of cures should be placed as high as 12 to 15 per cent. at the present time.

In those cases in which a fatal termination was reached before the three years' limit, Gross found that there was an average prolongation of life of ten months when the axilla had been dissected.

I regret to say that I have not had an opportunity to ascertain the histories of all the cases of my series. I have, however, been able to follow the history of several mentioned in a former paper,⁷ and will briefly refer to them here.

Three years and a half immunity. Mrs. B., Amesbury, Mass., about sixty years of age. Disease had existed two months. A hard and voluminous cancer of the breast, with large glands in the axilla extending as high as the clavicle. The completed operation was performed. The case was not a promising one, and in former times I should have declined to operate. The operation was performed July 9, 1885. Dr. H. G. Leslie writes me, under date of January 14, 1889: "I have to report that Mrs. B. still remains in perfect health, with no signs of the recurrence of the disease."

Four years' immunity. Miss B., about forty years of age, was operated upon in December, 1884. First noticed a tumor in the breast the previous winter; but an eczema of the nipple had existed in 1883. No glands were felt in the axilla; but the completed operation was nevertheless performed, with the result of finding one small nodule in the axilla. She was married October 15, 1888, after an engagement of seven years' standing, no sign of a recurrence having shown itself, and her health having greatly improved.

Four years and a half immunity. Miss J., Haverhill, Mass., was operated upon in June, 1884. The breast was very voluminous and the cancerous nodule was small, and situated near the sternal margin. The axilla was opened, but no glands found. Dr. M. D. Clarke writes me, under date of January 30th, 1889, that he has recently visited Miss J., and that there has been no return of the disease.

Five and a half years' immunity—recurrence. Grace M., forty-five years of age, was operated upon in the hospital, in July, 1882. There was no gland in the axilla. Had first noticed a lump three years before; no return of the disease until the autumn of 1887. A lump was then felt in the axilla.

A nodule the size of a hen's egg was removed from the axilla in July, 1888. It was found to be a colloid cancer. There was no return in the breast. At the present date both breast and axilla are free from disease; but the patient's general health is not good, and I fear a development of the disease internally. I cannot help feeling that, had the completed operation been performed in this case, there would have been no recurrence.

Ten years' immunity. M. E. M., thirty years old. Disease four years' duration. An ill-defined tumor of the right breast, the size of an egg. Operation performed September 18, 1878. The tumor, on section, was found to be very dense, and infiltrating nearly the whole breast. The breast was excised, but the axilla was not opened. The patient was living in January, 1888, and there had been no return of the disease. This case is taken from the record book of the hospital; and, as no microscopic examination was made, and I have no recollection of the case, the diagnosis may be considered doubtful.

If we add to Gross's 53 cases of completed operations my own 32 cases, we have a series of 85 cases with only two deaths.

It seems fair to assume, therefore, that a mortality rate of 3 per cent. is not too much to hope for in the future.

If Butlin, whose operations are much less radical than those of Gross, thinks that cures are obtained at the present time in 15 per cent. of the cases operated upon, may we not hope for a still further increase of this percentage if a ready method of diagnosis enables us to operate in the earlier stages of the disease?

I do not think it is too much to expect that, when the statistics of the next few years are rolled up and counted, we shall find that surgery has succeeded in accomplishing a cure in 20 per cent. of the cases.

I am well aware that many interesting points of this subject have not been touched upon, but the intended scope of this paper will hardly authorize my trespassing further upon your time.

⁷ Boston Medical and Surgical Journal, February 17, 1887.

A CASE OF TUMOR OF THE BRAIN: REMOVAL; DEATH.¹

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III. GENERAL MEDICAL CONSIDERATIONS UPON DIAGNOSIS AND THE ADVISABILITY OF OPERATION, WITH REMARKS ON CRANIO-CEREBRAL TOPOGRAPHY. (DR. KNAPP.)

1. The Diagnosis.

I will not attempt to discuss the subject of cerebral localization as applied to intra-cerebral growths. That has been done so many times of late as to render another essay on the subject needless, so that I will speak here merely of the reasons which

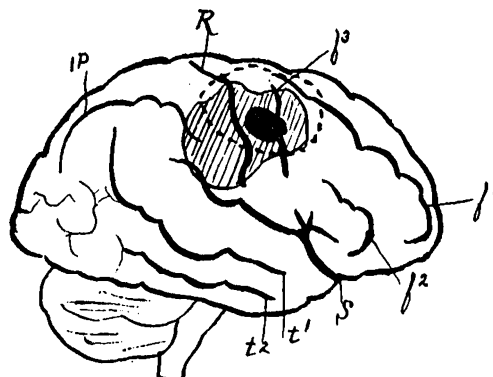


FIG. 6.—View of the right hemisphere of the brain, $\frac{1}{3}$ natural size. Reduced from Dalton, Series A, Plate 11. The black spot was drawn before the operation, as showing the chief seat of the tumor, and the dotted line as showing its probable size and extent. The shaded portion represents the probable position of the tumor, obtained by placing the tumor on the diagram as nearly as possible in the position it occupied in the brain, supposing the black spot to be beneath the crura. The tumor lay obliquely. IP, interparietal sulcus; t_1 , t_2 , first and second temporal sulci. Other letters as before.

led me to believe that we had to do with a subcortical tumor of considerable size situated in the middle and upper portions of the right ascending frontal and parietal convolutions. (Figs. 6, 7, 8.)

(1) *The Diagnosis of the Tumor.*—In many cases, of course, the diagnosis of a cerebral tumor is difficult, and it may be impossible. In this case, however, it was easy. The four classical symptoms of tumor—headache, vertigo, vomiting, and optic neuritis—were all present, while the gradual mental failure and the increasing weakness, with the neuritis, showed increasing intracranial pressure, and strengthened the diagnosis. Additional evidence in favor of the existence of a tumor was afforded by the focal symptoms.

(2) *The Diagnosis of the Location of the Tumor.*—The symptoms given above showed that we had to do with a tumor; the symptoms which helped to determine its situation were the



FIG. 7.—Horizontal section of the right hemisphere through the centre of the black spot, showing the position of the tumor, $\frac{1}{3}$ natural size. Reduced from Dalton, Series B, Plate 11.

¹ Continued from page 330.