DIATHERMY IN DISEASES OF THE THROAT AND NOSE.*

BY

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SURGICAL DIATHERMY—sometimes called the cold cautery—consists in coagulation of the tissues by heat generated in the tissues themselves by the passage of a high frequency current of considerable strength. Up till comparatively recently, high frequency currents were not used in surgery, only minute currents of a few milliamperes being used for the destruction of small naevi, removal of superfluous hairs, etc. In diathermy, currents running up to 1 to 2 ampères are often used in throat operations.

The first operations by this method in this country were performed by Professor Nagelschmidt of Berlin in Mr. Harmer's clinic at St. Bartholomew's in 1910. He removed a large malignant growth of the soft palate, an inoperable naevus of the tongue, and enlarged tonsils. Mr. Harmer became the pioneer of this treatment in England, and since he showed his first case at the Laryngological Section of the Royal Society of Medicine (a case of inoperable cancer of the fauces) a great number of throat surgeons throughout the country have taken up this way of operating, and have recorded very satisfactory results. Although greatly interested after seeing Mr. Harmer operate on several cases, the war prevented my doing any cases till this year, and I have to thank the surgical staff of the Royal Victoria Infirmary, Newcastle-on-Tyne, for allowing me to operate on some of their cases.

In the following description of the method of using diathermy I have thought principally of operations for malignant disease of the mouth and throat; but in all essentials the method is the same for any growth. Various ends for the active electrode are used, and various methods may be used in dealing with the growth according to its size and situation (it may be removed or coagulated *in situ*), and different strengths of the current are needed; 300 to 400 milliamperes may be sufficient when an angioma has to be coagulated, and 2 ampères are required when dealing with a large malignant growth.

Prior to operations on the mouth and throat the mouth must be got into as healthy a condition as possible, and septic and decayed teeth attended to. At the time of operation the growth should be painted with iodine. A large negative electrode, thickly padded with cloths thoroughly wetted with saline, is placed on the chest, back, or thigh of the patient, and it is important to have this electrode lying evenly and in close contact at all points, otherwise burning may occur. I use three towels as the pad, and, if the operation is long, inspect the place to which they are applied, so that any signs of burning or scalding may be detected at once. The growth is dried and a small active electrode placed on it. The current is switched on and gradually increased until of sufficient strength, and it is then kept at this strength in the following applications. The result of passing a large current through this small electrode is that great heat is generated in the tissues below the electrode. They turn white and bubbles appear, and if the current is allowed to flow sparks begin to leap from the electrode. The application should not be long enough to allow these sparks to appear, and the current should always be switched off before the electrode is removed from the growth, as, if this is not done, sparks fly when it is taken off, and surrounding tissues are injured. The coagulation extends to a considerable depth, varying according to the strength of current and length of application. The whole growth is gone over in this way until it is coagulated *in situ*, and, should it be necessary to coagulate more deeply, some of the slough may be gently scraped away, and the electrode again applied. The tissues become intensely hot after one or two applications, and it is advisable to wait a short time to let them cool, or unnecessary damage may be done to surrounding parts.

As the heat coagulates the tissues it also sterilizes them, so that a large, deep, sterile slough remains. There is no bleeding during the operation, as blood vessels and lymphatics are sealed. This is a matter of considerable

importance, particularly in malignant growth, as these channels of septic absorption and dissemination of growth are left open in all cutting operations, and in cutting operations there is always a risk of implanting malignant cells in healthy tissues. Some of the slough may be gently scraped away to hasten its separation, but it should never be removed to such a depth that there is any risk of hæmorrhage, nor should any except quite loose pieces be removed, as it is being thrown off during the process of healing. There is often, after the operation, a considerable outpouring of lymph and oedema in the surrounding tissues. Cases have been recorded where tracheotomy has been required, and in all operations in the neighbourhood of the larynx this should be done as a preliminary.

The temperature may be raised for the first two days, but rarely reaches 100°, and generally subsides in forty-eight hours, when in many cases the patient may get up, even after extensive operations. There is soreness in the operation area, but the pain is less than in cutting operations or where a cautery has been used, and a patient whose soft palate and fauces I operated on was eating solid food on the third day. The resulting slough looks rather alarming, and makes one think of secondary hæmorrhage, septic absorption, and septic pneumonia. Secondary hæmorrhage is a danger when working near large vessels, but smaller vessels are closed by coagulation. Septic absorption is less than in cutting operations, for the reasons given above, and septic pneumonia does not occur more often than when the knife is used, and many say less often. I have had no cases up to the present. As the slough separates a healthy granulating surface is left, which rapidly becomes covered with epithelium, and in many cases there is little formation of fibrous tissue, so that a soft pliable scar results.

I wish to speak mainly of the use of this method in malignant disease, so I will only mention briefly some other conditions in which it has proved valuable.

Naevi and cavernous angiomata, situated on the lip, cheek, tongue, etc., have been dealt with very satisfactorily. They can be coagulated piecemeal when large and otherwise inoperable, and when they affect the lip or cheek they can be attacked from within the mouth so that no scarring results.

Tonsils.—In a certain number of cases the contraindications to removal are so strong that, although the tonsils need to be enucleated, they are not operated on, or only with much misgiving and hesitation. Such cases can be dealt with entirely satisfactorily.

Lupus.—Nasal lupus, as we all know, is one of the most intractable conditions. Scraping, cautery, ionization, x rays, local applications of drugs are all tried, often with little effect, and one works on with these cases for months. I have lately been treating by diathermy a few cases sent me by Dr. Bolam and Dr. Thompson. It is too early to make any definite statement as to cure in these cases, but Dr. Thompson, who has been watching them, agrees with me that they have made greater improvement in a shorter time than they would have done by other methods. (Nagelschmidt said he could do more in two or three applications than he had previously done with 600 to 700 hours' exposure to Finsen rays.) All have been having x-ray treatment for some months. One patient, in whom both vestibules, the septum and the inferior turbinates were involved, has had four applications. The ulcerated surface is healed and, at present, no signs of growth can be seen. Another very similar case now shows only a small healing patch on the inside of the ala. The applications are very easy to carry out. A fortnight elapses between each treatment, which only takes a minute or two, and is practically painless, as cocaine is previously employed.

Nasal synechiae, nasopharyngeal fibromas, and rodent ulcers have also done well under this treatment.

Turning to malignant growths of the mouth, fauces, etc., it is, of course, impossible in any case to make a definite prognosis. A small growth easily removed may rapidly recur, while in another case, where operation appears almost hopeless, the patient may remain free from recurrence, or it may only reappear after a long time, during which the patient has been in good health. One can only say that a slow growth, in which there is no involvement of the glands, occurring in an elderly person, offers the best prognosis; but even in such a case one at times finds a rapid recurrence, and the recurrence is often of a more malignant nature than the primary growth.

We may divide malignant growths into (a) those which can be operated on by the knife; (b) those which cannot be operated on by the knife. Many of the former cases can be safely and easily dealt with in the ordinary way, but in others operation entails severe shock and risk, both at the time of operation and subsequently. I do not wish to say that all cases should be operated on by diathermy,

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but many now operated on by cutting operations would be dealt with equally well, if not better, so far as the removal of the growth is concerned, and with much greater safety and comfort to the patient, were diathermy used. It is often very difficult indeed to cut sufficiently wide of a growth involving the floor of the mouth or the posterior half of the tongue, but comparatively easy to coagulate. Growths of the fauces, soft palate or pharynx involve severe operations which can be done with much greater ease, safety, and rapidity by diathermy. Growths in the aryteno-epiglottidean region must also be included. In many cases coagulation and cutting can be combined. I removed half a tongue in this way with no haemorrhage, and more widely than if knife and scissors alone had been employed. The lingual artery was tied to minimize the risk of secondary haemorrhage, but even then, had cutting alone been employed, there would have been free bleeding.

Passing to the cases which are inoperable by cutting operations, they may be divided into: (1) Those which can be operated on by diathermy; (2) those which are inoperable. Of the former group, some are attacked with the hope that recurrence will not take place for a long time, and others to relieve symptoms. Many growths are so situated that they rapidly pass beyond the range of the knife, and many patients are not seen till this stage is reached: growths of the tongue in its posterior part, fauces and pharynx are examples. Sprays, etc., are used to keep the growth clean, morphine to ease the pain; but the patient goes downhill steadily, suffering great pain and discomfort, and death is a relief to him and his friends. There are now numbers of such cases recorded who have been operated on by diathermy and have lived in comfort for a considerable time without recurrence; when recurrences have taken place, they have been treated again and life prolonged. I have such a case to show this afternoon. He had an inoperable growth of soft palate, uvula and left fauces in April, was treated by diathermy on May 6th, 1920, and there is no sign of recurrence at present. There are other cases in which life has not been prolonged to any extent, but where symptoms have been greatly relieved, and they have died a much less painful death. One of the things which everybody who has used diathermy has noticed is the great relief from, or modification of, pain that often occurs, even in cases in which the whole growth cannot be removed. Massive ulcerating growths causing dysphagia and dyspnoea may be treated, giving the patient relief from these conditions.

Diathermy is no more a cure for malignant disease than any other treatment, but it can be used not only in cases which are operable in the ordinary way with greater safety and often with greater advantage, but also in cases which are beyond the scope of the knife. Post-cricoid growths—86 per cent. of which occur in women, and many in comparatively young women—have been dealt with, and life prolonged and much relief afforded, the pain and difficulty in swallowing being greatly relieved and in many cases temporarily cured. The operation is by no means without risk, but the condition is so desperate that the risk is justified. Cutting operations show a very high mortality, and can only be attempted in very early cases. Stuart Low has shown a number of cases in which large masses of malignant glands, which could not be removed, have been delayed in growth and diminished in size, and pain greatly modified, by plunging a diathermy point into them in many places. He dissects the cutaneous tissues off the growth first, and after the operation sutures them again, and in no cases has he had any ill effects follow.

It has been impossible owing to time to mention much of interest, and only a brief outline has been attempted; but I shall conclude by tabulating the advantages and disadvantages of diathermy.

Advantages.

Shock is practically nil, even after extensive operations. Pain after the operation is less than after operation by knife or cautery.

Temperature is only slightly if at all raised, rarely reaches 100°, and drops within forty-eight hours.

The dangers of metastasis are much less than with cutting operations, blood vessels and lymphatics being sealed.

Risk of septic absorption is less than in any other form of operation.

There is complete destruction of visible and palpable malignant disease, and probably many outlying cells are destroyed

which could not otherwise be reached. Malignant cells are of lower vitality than those of healthy tissue.

The operation is practically bloodless, is rapidly and easily performed, and can be easily repeated if necessary.

Tumours that are otherwise inoperable can be attacked.

Convalescence is rapid.

In many cases which are hopeless, relief can be given to the patient.

Disadvantages.

Healthy and diseased tissues are destroyed, but in cutting operations this also takes place.

Important vessels and nerves cannot be seen.

There is danger of secondary haemorrhage when working near large blood vessels.

There is a tendency to the formation of keloid when skin surfaces are involved.

THE MATERNITY HOSPITAL, WITH ITS ANTE-NATAL AND NEO-NATAL DEPARTMENTS.

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A NEO-NATAL ward and clinic, an ante-natal clinic, and a pre-maternity ward are all needed in order to complete a modern maternity hospital in its rounded fullness. Gynaecological and pathological departments may be added to the building or may be provided elsewhere, according to the requirements or the institutional resources of the city or town in which the maternity hospital is situated; but the neo-natal and ante-natal departments are essential to the entire fulfilment of its purpose.

The maternity hospital occupies a separate place among hospitals, for, whilst they are designed for the relief of the sick, it is for the reception of many to whom the words "absolutely healthy" may be fitly applied. It is a hostel rather than a hospital. When Sir Thomas Browne wrote, "For the world, I count it not an Inne, but an Hospital, and a place, not to live, but to die in," he was not thinking of the ideal maternity hospital of to-day and to-morrow, but of the very real general hospital of his time. When criticism asks ironically if living healthy mothers accompanied by living healthy babies always emerge from maternity hospitals, one has, of course, to admit sadly that they do not. With this admission, however, one is now justified in asserting that the things of which they die are preventable in the case of the mothers, and generally so in the case of their infants. The recognition of the preventability of maternal deaths in connexion with parturition has become wonderfully clear in recent years, and systematized efforts are now being made in many places and by ante-natal clinics and pre-maternity wards really to prevent such fatalities. On account of a less degree of familiarity with the causes of the diseases of the newborn infant it is not realized how possible their prevention also is; indeed, it is scarcely recognized how terribly fatal these maladies are, although the separate publication of the neo-natal death rate does not long leave this depressing conclusion in doubt. Their severity and their preventability are the incentive and the justification for the neo-natal department of the maternity hospitals of the future.

The Maternity Hospital of the Nineteenth Century.

Up to the close of the nineteenth century the maternity hospital was held to have discharged its legitimate functions when it made itself responsible for the care of women in labour, and of them and their babies in the puerperium. Within this limited sphere of service they achieved a measure of success, and their occasional but rather spectacular failures were in process of restriction towards the end of the century by the introduction of the practice of antiseptic and aseptic principles. Their too complete concentration upon the act of delivery and upon the days of recovery following it was, however, a heavy handicap to real progress in the rational understanding and in the practical solution of the problem of attaining safety in human reproduction. No amount of perfection in operative technique or in instrumental resource could cancel or annul the absence of supervision and care in the ante-natal months; one might, if one cared, speak of the brilliant performance of a craniotomy, but the executive