LETTSONIAN LECTURES ON THE OBJECTS AND LIMITS OF OPERATIONS FOR CANCER.

*Delivered before the Medical Society of London,
February 24th, 1896.*

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LECTURE III.

IN this lecture I shall begin by discussing the following points with regard to cancer of the pharynx: (1) The question of preliminary tracheotomy; (2) the control of the bleeding; (3) the removal of the glands; and (4) the methods of gaining access to the primary cancerous mass. After considering these points, I shall refer to the after-treatment and the results.

I.—THE QUESTION OF PRELIMINARY TRACHEOTOMY.

It is, of course, an advantage, if one can manage it, to avoid preliminary tracheotomy, for that adds additional complications in several ways. In the first place, it means another wound which must become septic; it means irritation of the trachea by the presence of the tube and the admission of cold air; and it also means very distinct interference with coughing and the power of expelling any discharges which may have entered the larynx. Where the external carotid artery is ligatured, and the bleeding is consequently very small, there is not much chance of blood entering the trachea, especially if the head is thrown well back; and in cases where the jaw is divided, and more especially where a portion is taken away, it may also be possible to avoid the risk of blood passing into the lung. Where, however, an attempt is made to remove the tumour without division of the jaw, or without ligature of the external carotid artery, and where the mass fills up the throat, and more especially where it runs down towards the entrance of the larynx, and on to the tongue, the necessary manipulations cannot be carried out without interfering with the breathing, and exciting so much effort on the part of the patient, that there is a very great risk of septic discharge and blood being drawn into the lungs; and besides, it is very necessary in these operations, in order to insure that the disease is as thoroughly removed as possible, that there shall be no haste in their performance, and that the surgeon shall be able to see exactly what he is doing. Some prefer to do the tracheotomy three or four days before the major operation, but I fail to see the advantage of this; on the contrary, it must be remembered that after three or four days the discharge from the tracheotomy wound has become more or less septic, and consequently, in introducing a big tube such as Hahn's, some of the pus may be pushed before it into the trachea. It is well to bear in mind that where septic pneumonia occurs by direct entrance of materials into the air passages, and not as the result of general infection, it is not the entrance of pure blood which sets it up, but of blood mixed with the septic discharges from the throat, or of pure blood in the first instance fouled subsequently by the inhalation of the putrid materials from the wound.

On looking at Table III. it will be seen that in Group II *a* the mortality where tracheotomy was performed is double that where there was no tracheotomy—namely, 38 per cent. in the former case to 19 per cent. in the latter, and further, we find that of the fatal cases with tracheotomy (13 in number), 7, or 20 per cent. of the cases operated on, died of septic lung trouble, while only 1 of the fatal cases without tracheotomy (7 in number) or 2 per cent. of the cases operated on, died from the same cause. On these bare facts one would be inclined to regard tracheotomy as a very serious addition to the risk; but on looking into the cases we see that those in which tracheotomy was performed were on the whole much more severe, and consequently accompanied with greater danger. Further, it will be found that in 6 out of the 7 tracheotomy cases which died of septic pneumonia the base of the tongue was affected,

and this was also the case in the patient who died without tracheotomy. It is evident, therefore, that the seat of the disease had much to do with the fatal result, and I do not think that we can fairly attribute the septic pneumonia to the tracheotomy. At any rate, it is clear from these facts that preliminary tracheotomy is by no means an absolute safeguard against septic pneumonia, and I should be inclined to try to do without it where the disease is high up, or where it is behind the tonsillar region, and where the base of the tongue or the neighbourhood of the glottis are not interfered with. Where the base of the tongue is interfered with, the patient does not swallow nearly so readily as where this is not the case, and consequently discharges are apt to accumulate about the orifice of the larynx, and so get down into the trachea after the operation. Hence in these cases I think that it is well not only to perform preliminary tracheotomy but also to go on with Hahn's tubes for some days after the operation, till, in fact, the patient has, to some extent at any rate, regained the power of easy swallowing.

II.—CONTROL OF THE HÆMORRHAGE.

In most of my cases I have tied the external carotid artery so as to have the seat of the primary tumour free from bleeding, and as regards this point the result has been extremely satisfactory. In none of the cases had I to tie or clamp any vessels with the exception of one or two veins. Practically no blood was lost, and the area of the operation being more or less bloodless, one could remove the disease with precision and feel pretty sure that one was cutting wide of it in all directions. The control of the bleeding in this way is of the greatest importance from the point of view on the one hand of the immediate danger of the operation, namely, the entrance of blood into the air passages, and on the other of the radical removal of the disease; but there are very serious objections to it, and I doubt if it is an advisable practice as a general rule. Working so much with aseptic wounds as one does nowadays, one is apt to forget that there is such a thing as secondary hæmorrhage, and that where a wound becomes septic, ligatures around large vessels very commonly ulcerate through, and then the main obstacle to hæmorrhage is the clot in the vessel. In the case of the external carotid artery little or no clot forms on the proximal side of the ligature, and therefore if it separates too soon there is practically no barrier, and bleeding is very apt to occur. Hence it has happened that in most of the cases in which the external carotid artery has been tied severe, and sometimes fatal, secondary hæmorrhage has occurred from the artery. It was partly with the view of avoiding this risk that I divided the operation into two stages in Case II, and in that instance there was no trouble whatever with the ligatured artery, and the result as regards hæmorrhage during the second operation was perfectly satisfactory. Whether this division of the operation into two stages is a good thing or not I shall discuss by and by; it certainly gives us a means of avoiding secondary hæmorrhage from the ligatured external carotid artery, and at the same time gives us a bloodless wound. Failing this division of the operation into two stages I am inclined, much against my will, to give up the preliminary ligature of the external carotid artery in most cases, and either tie its branches, or control the bleeding by temporary compression of the artery during the removal of the tumour. That, however, introduces another problem, namely, division of the lower jaw, for without that, where the disease is situated in the tonsillar region, one might have difficulty in getting proper access to the bleeding points, while I think it is an advantage if possible not to interfere with the jaw. Where, however, for any reason the jaw has been divided, one can get good access to the bleeding points and need not tie the artery previously.

III.—THE REMOVAL OF THE GLANDS.

The remarks made with regard to the removal of the lymphatic area in cases of breast cancer apply with equal force to these cases. It is seldom indeed that no enlarged glands can be felt, and in most instances they are of very considerable size. Whether glands are felt or not, however, the lymphatic area ought to be cleared out, and as I have already said, one of the great advantages of the cervical region is that a very large glandular area is accessible, and

not only can a large portion be cleared out at the time of the operation, but also glandular recurrences beyond the anterior triangle if seen early can be freely and hopefully dealt with.

Most surgeons look on the presence of enlarged malignant glands in the neck—unless they are quite small and non-adherent to the vessels, and only one or two in number—as a contraindication to operation in these and in tongue and laryngeal cases, or, at any rate, as a very grave complication. For my own part, I do not at all agree with this view unless the glandular enlargement is very extensive, or adherent to a variety of structures in the neck and not merely to the sheaths of the vessels, and I see no contraindication to operation in their presence; on the contrary, I think the operation will be more thoroughly done and the patient will have a better chance of recovery and cure if enlarged glands are already present; for in the first place, where the glands are already enlarged it is much more easy to remove the whole glandular area in one mass than it is where there are no enlarged glands to be felt; and in the second place, the presence of enlarged glands in the anterior triangle renders it imperative to remove the neighbouring lymphatic area, especially that under the sterno-mastoid muscle, so that if glandular recurrence subsequently takes place, it will in all probability be in the posterior triangle, that is to say, in a part which is easily accessible for future operation. Where there is no noticeable enlargement of the glands, on the other hand, it is a very difficult matter to take away all the glands and fat in the anterior triangle, while one is very apt in an extensive operation to leave the material under the sterno-mastoid alone, and yet the glands in that situation are very early infected. Where an attempt has been made to remove this lymphatic area, and where it has not been successful and glandular recurrence subsequently takes place in the anterior triangle, we have in the second operation to deal with glands lying in scar tissue, and their subsequent satisfactory removal is a very difficult and sometimes almost impossible matter. These statements are not in any way theoretical, but are founded on considerable experience in cancer of the tongue and other regions in that neighbourhood, and also on a very extensive experience of radical operations for tuberculous cervical glands.

Abstract of TABLE III.—Cases of Malignant Disease of the Pharynx.

TOTAL RESULTS.

[D=died. C=no recurrence for 3 years. R=recurred soon, and inoperable. H=healed, and well at last note more than six months after operation. H?=healed, but no note later than 6 months after operation. R (good)=a long interval before recurrence. R (H)=recurred, operated and healed. R (H?)=recurred, operated and healed, but no further notes.]

GROUP I.—Cases where the disease was removed from the mouth, with or without splitting the cheek, and with or without tracheotomy—where, in fact, there was no wound in the neck communicating with the mouth:

(a) Carcinomata, 13 cases—2 D, 4 H?, 1 R (good), 3 H, 3 C.

(b) Sarcomata, 10 cases—5 R, 3 R (good), 2 R (H).

Total 23 cases—2 D, 4 H?, 5 R, 4 R (good), 2 R (H), 3 H, 3 C.

Mortality, 8.6 per cent.; no benefit, 30 per cent.; benefit, 25 per cent.; cured, 13 per cent.

GROUP II.—Cases of disease in the pharynx where the internal wound communicated with a wound in the neck:

A. Where the disease was situated in or in the vicinity of the tonsils, and extended from thence to the neighbouring parts.

1. Where the jaw was not divided:

a. No tracheotomy.

(a) Carcinomata, 6 cases—2 D, 2 R, 1 R (H?), 1 H.

(b) Sarcomata, 5 cases—2 H?, 1 R, 1 R (H), 1 H.

Total, 11 cases—2 D, 2 H?, 3 R, 1 R (H?), 1 R (H), 2 H.

b. Tracheotomy.

(a) Carcinomata, 9 cases—5 D, 1 H?, 3 R.

Total where jaw was not divided:

(a) Carcinomata, 15 cases—7 D, 1 H?, 5 R, 1 R (H?), 1 H.

(b) Sarcomata, 5 cases—2 H?, 1 R, 1 R (H), 1 H.

Total, 20 cases—7 D, 3 H?, 6 R, 1 R (H), 1 R (H?), 2 H.

Mortality, 35 per cent.; no benefit, 65 per cent.; benefit, 15 per cent.

2. Where the jaw was divided—

a. No tracheotomy.

(a) Carcinomata, 20 cases—4 D, 7 H?, 7 R, 1 R (good), 1 H.

(b) Sarcomata, 5 cases—1 D, 1 R, 1 R (H?), 2 H.

Total, 25 cases—5 D, 7 H?, 8 R, 1 R (H?), 1 R (good), 3 H.

b. Tracheotomy.

(a) Carcinomata, 16 cases—5 D, 3 H?, 4 R, 2 R (H?), 1 R (C), 1 H.

(b) Sarcomata, 9 cases—3 D, 3 H?, 2 R, 1 H.

Total, 25 cases—8 D, 6 H?, 6 R, 2 R (H?), 1 R (C), 2 H.

Total where jaw was divided—

(a) Carcinomata, 36 cases—9 D, 10 H?, 11 R, 2 R (H), 1 R (good), 1 R (C), 2 H.

(b) Sarcomata, 14 cases—4 D, 3 H?, 3 R, 1 R (H?), 3 H.

Total, 50 cases—13 D, 13 H?, 14 R, 3 R (H?), 1 R (good), 1 R (C), 5 H.

Mortality, 26 per cent.; no benefit, 54 per cent.; benefit, 14 per cent. Mortality where no tracheotomy = 19 per cent.; where tracheotomy = 38 per cent.

Total results of Group II, A.—

(a) Carcinomata, 51 cases—16 D, 11 H?, 16 R, 3 R (H?), 1 R (good), 1 R (C), 3 H.

(b) Sarcomata, 19 cases—4 D, 5 H?, 4 R, 1 R (H?), 1 R (H), 4 H.

Total, 70 cases—20 D, 16 H?, 20 R, 4 R (H?), 1 R (H), 1 R (good), 1 R (C), 7 H.

Mortality, 28 per cent.; no benefit, 57 per cent.; benefit, 14 per cent.

B. Where the pharyngeal disease was at a lower level than the tonsillar region, or at any rate did not involve it.

(a) Carcinomata, 9 cases—4 D, 3 R, 1 H?, 1 H.

(b) Sarcomata, 6 cases—2 D, 2 H?, 1 R (H?), 1 H.

Total, 15 cases—6 D, 3 R, 3 H?, 1 R (H), 2 H.

C. Where the epiglottis was the centre of the disease.

(a) Carcinomata, 4 cases—1 D, 1 H?, 2 R (good).

(b) Sarcomata, 2 cases, 2 H.

Total, 6 cases—1 D, 1 H?, 2 R (good), 2 H.

Total result of Group II.—

(a) Carcinomata, 64 cases—21 D, 13 H?, 19 R, 3 R (H?), 3 R (good), 1 R (C), 4 H.

Mortality, 32 per cent.; no benefit, 62 per cent.; benefit, 12 per cent.

(b) Sarcomata, 27 cases—6 D, 7 H?, 4 R, 2 R (H?), 1 R (H), 7 H.

Mortality, 22 per cent.; no benefit, 37 per cent.; benefit, 29 per cent.

Total, 91 cases—27 D, 20 H?, 23 R, 5 R (H?), 3 R (good), 1 R (H), 1 R (C), 11 H.

Mortality, 29 per cent.; no benefit, 54 per cent.; benefit, 17 per cent.

GROUP III.—Where the disease involved both pharynx and larynx—

(a) Carcinomata, 55 cases—30 D, 4 H?, 14 R, 2 R (good), 1 (H), 4 H (died without recurrence).

(b) Sarcomata, 3 cases—1 R, 2 D.

Total, 58 cases—32 D, 4 H?, 15 R, 2 R (good), 1 H, 4 H (died, well).

Mortality, 55 per cent.; no benefit, 81 per cent.; benefit, 12 per cent.

GROUP I. Mortality. 8.6 per cent. No benefit. 30 per cent. Benefit. 25 per cent.

GROUP II. Mortality. 29 per cent. No benefit. 54 per cent. Benefit. 17 per cent.

GROUP III. Mortality. 55 per cent. No benefit. 81 per cent. Benefit. 12 per cent.

After the preliminary tracheotomy, the next step in the operation is the exposure of the anterior triangle and the thorough separation of the fat and glands, and through the same wound the external carotid artery and its branches can be tied or controlled. For this purpose the best incision is one running along the anterior border of the sterno-mastoid muscle, from the mastoid process above, down to the middle of the thyroid cartilage. The skin incision cannot be too free; the usual mistake that is made is to try to remove the glands through too small an opening, and we must remember that we have not only to take away the enlarged glands in the anterior triangle, but that we must also be able to lift up the sterno-mastoid muscle and remove all fat and glands behind it, especially towards the upper part.

In the first instance the edge of the sterno-mastoid muscle is exposed, and the skin and fat in front of the incision are turned well forwards; in the next place I divide the deep fascia at the lower part of the incision and expose the internal jugular vein. It is very seldom, if the glands have attained any size, that they are not adherent to the sheath of the vessels, and therefore the anterior part of the sheath must be removed; indeed, where adhesion to the sheath is at all extensive (and in fact this is so in most cases of malignant glands), it is well to tie the internal jugular vein in two places at the lower part, divide it, and then peel it up along with the sheath and the mass of glands in front of it. In this way one can make a much better clearance of the anterior triangle than in any other; the lingual and other branches of the vein must, of course, also be tied, and the upper end can readily be ligatured close to its exit from the skull. As the mass is peeled forward, the deep fascia is divided in front and behind, care being taken with the spinal accessory nerve, which usually divides the glandular enlargement into two parts. In none of my cases have I found it actually involved in the growth, and usually without opening the diseased glands they can be separated sufficiently to disentangle the nerve. Next, by the aid of a curved blunt instrument, all the fat and glands must be detached from underneath the sterno-mastoid muscle right up to the mastoid process and well into the posterior triangle, and this material peeled off so as to leave the deep muscles clean. I consider that this is a most important thing to do, for recurrence so frequently takes place under the sterno-mastoid muscle, and it is almost impossible at a second operation to make sure of removing all the disease.

With regard to the removal of the jugular vein, I may say that it need not give rise to the least anxiety; it does not add anything whatever to the danger of the operation, and I have often had to do it in cases of operation for tuberculous glands without any harm resulting. I have never seen reason to regret having taking it away, but I have more than once regretted that I had not done so, recurrence having taken place in small glands which had been left attached to the sheath and overlooked, but which would have been removed if the vein, sheath, and everything in front of it had been taken away in the manner described. Besides, I think that there is another advantage in removing the vein in these pharyngeal cases, for if a septic thrombus should form in one of the small veins about the wound—as may very likely happen—it cannot get any further, and I have been much surprised at the small amount of septic disturbance in my cases.

In connection with the removal of the glands there is one other point to which I may here refer—namely, the advisability of dividing the operation into two stages done on different days, in the first instance removing the glandular mass, and a week or ten days later attacking the primary disease. I did this in two cases, and the plan has advantages as well as disadvantages. The reasons which induced me to do it in these two cases were: In the first place and chiefly that the patients were weakly, and that both the primary disease and the glandular mass were extensive, so that I feared the shock if the whole operation were done at one time. A second reason was that Case VIII had just previously died of hæmorrhage from the external carotid artery, and I thought that the risk of this would be considerably diminished if the end of the artery, lying in an aseptic wound for some days, were to become buried in new tissue. The third possible advantage of performing the operation in two stages is that the planes of the cellular tissue in the neck would become more or less sealed by organising tissue before being exposed to the septic influences from the mouth. The last is a point on which I do not lay much stress, but the other two points are important.

Against this division of the operation into two stages there is, however, one very serious objection—namely, that after removing the glands open lymphatic vessels are left which may contain or convey cancerous material to the newly made wound, and thus infect it before the second operation; and this infection, being microscopic, could hardly be eradicated, unless possibly by painting the raw surface with a strong caustic. Case LXXXIV, in which I divided the operation into two stages, is the only one in which there has been a local recurrence, and in that case the recurrence was almost immediate; and yet when we had finished the operation, so far as we could judge, we had cut well wide of the growth in all directions, and there was no trace of any disease to be seen. Here I am much inclined to think that there had been an infection of the wound from the divided lymphatics, and so strongly am I impressed with this risk, that I would not divide the operation into two stages unless under exceptional circumstances, such as great weakness on the part of the patient, or possibly in some cases where I thought ligation of the external carotid artery would be very desirable, and if I were to do so I would thoroughly sponge out the reopened part of the old wound with undiluted carbolic acid.

IV.—ACCESS TO THE PRIMARY DISEASE.

There are many ways in which access has been obtained to the tonsillar region, but it is unnecessary for me to discuss them all. The essential point centres round the question as to whether it is necessary or not to divide the lower jaw, and as regards this we have again two points for consideration—namely, whether it is sufficient to divide the lower jaw as in Langenbeck's operation, or whether it is not better to remove the ascending ramus altogether as in Mikulicz's plan. Division of the lower jaw, or removal of the ascending ramus, are of course procedures which it is desirable to avoid if possible. In the first place, the division of the bone must add considerably to the septic risk by leaving a compound fracture in a septic wound, and it also must add to the shock. At first sight this statement seems to be in opposition to the facts as shown by Table III, where the mortality after division of the jaw is 26 per cent. as compared with 35 per cent. where the

jaw was not divided, but in the latter case the numbers are a good deal smaller, and 4 of the 7 deaths were due to hæmorrhage, other 2 also occurred in connection with ligation of arteries, and the 7th from post-operative mania; so that in none could the retention of the lower jaw be held responsible for the result. In the second place, the divided ends of the bone have in several instances failed to unite and a false joint has been left. Not that this is always a disadvantage, for where the disease involves the mucous membrane in front of the fauces, between the upper and lower jaws, the subsequent contraction of the wound is very likely to lead to more or less closure of the jaws, which, however, does not cause any very great inconvenience if there is a false joint in front. And lastly, necrosis of the divided ends of the bone has more than once occurred. On the other hand, there are great advantages to be gained by division of the jaw, and in some cases it is absolutely necessary. When the jaw is divided in front of the masseter and the two parts pulled aside, especially after division of the posterior belly of the digastric and the stylo-hyoid muscles, and with a skin incision running from the angle of the mouth to the upper part of the oblique incision in the anterior triangle, the whole region of the tonsil and side of the pharynx is completely exposed to view, and can be dealt with as precisely as if one were operating on a cutaneous surface; and if this is done there is of course no necessity for ligation of the external carotid artery, the bleeding points being easily secured. Where the disease involves the periosteum over the jaw, necessitating removal of a portion of it, or of the ascending ramus, the view obtained is still more perfect.

With regard to this question of dividing the jaw I would, however, point out that a marked increase in the space is obtained simply by dividing the posterior belly of the digastric and stylo-hyoid muscles. After this is done the jaw and the larynx can be pulled forward on that side to a very considerable degree. No two cases, however, resemble each other, and the methods must be varied in each instance. In my opinion the only constant incision is the oblique one in order to get access to the glands, and to free the vessels so that they can be pulled out of the way when the primary mass is being dealt with. Any further incisions that are made will vary according to the necessity of the case.

As regards subhyoid pharyngotomy, that is to say division of the thyro-hyoid membrane close to the hyoid bone, I do not think that there is any particular advantage in that in most cases. As I have already pointed out, one ought to open the anterior triangle freely in order to remove the glands in all instances, and one of the objects of subhyoid as opposed to lateral pharyngotomy is to save the superior laryngeal nerve. According to some writers this cannot be done where the subhyoid opening has to be extensive, though that is denied by others who have succeeded in avoiding a division of these nerves, but, as my epiglottis case shows, this nerve can also be spared in the lateral operation, and I believe one can get better access to the region of the epiglottis and the side of the pharynx and base of tongue through the lateral incision than by the subhyoid method. In my case, by an incision along the hyoid bone, in addition to the usual oblique incision and removal of the great cornu, I was able to take away the whole epiglottis and the back part of the tongue quite satisfactorily.

As to the method of removing these growths, it must be done by scissors or the knife, and they must be taken away in one piece. I do not think the result is at all satisfactory where the galvano-cautery, or the thermo-cautery, or the *écraseur* are employed. It is of the utmost importance to be able to examine the cut surface in its natural state, so as to be quite sure that all the disease has been removed, and this cannot be at all made out if we have a burnt or a crushed part to look at. Besides, if a burnt surface is left, a slough must separate, and bleeding is then very apt to occur, and in several of the cases in my list this has actually taken place.

[V. The lecturer then referred to the after-treatment of the cases and the mode of feeding, laying special stress on the careful cleansing of the mouth, and especially of the teeth, before the operation, and on free drainage of the wound.]

VI.—RESULTS.

I must now say a few words about the results, as shown in

Table III, which gives all the published cases as far as I have been able to collect them. I have divided it into three groups. In Group A we have operations of varying severity, some quite small, but the majority of considerable extent, some indeed, such as my case of sarcoma of the tonsil (No. 22), very extensive; but the great point of distinction between this group and the next is that the wound in the throat did not communicate with a wound in the neck. Group II comprises the cases which essentially belong to this subject, and in it are included all the cases where the wound in the throat communicated with a wound in the neck. This group I have broken up into three divisions according to the seat of the disease—namely, (1) the upper part of the pharynx with the tonsillar region as the central point, (2) disease at a lower level in the pharynx proper, (3) cancer of the epiglottis. In Group III we have to do with a very much more serious condition, where the disease is not confined to the pharynx, but has spread on to and involved the larynx, or *vice versa*. I shall in the first place consider the question of mortality, and then the results as regards cure or benefit, and as regards function.

(A) *Mortality*.—In Group I there were 23 cases with 2 deaths, or 8.6 per cent. mortality, 1 death being from pyæmia and 1 from exhaustion after hæmorrhages and recurrence of the disease. As regards risk to life, therefore, cases of this class are quite satisfactory. In Group II, also, the mortality is less than one would expect considering the great severity and extent of these operations, the total result being 91 cases with 27 deaths, or a mortality of 29 per cent. Of the divisions of this group, the highest mortality is found in B, where the disease affected the pharynx at a lower level than the tonsillar region, these cases numbering 15, with 6 deaths, or 40 per cent. mortality. The smallest mortality is in Division C, cases of removal of the epiglottis, where there was 1 death in 6 cases, or a mortality of 13.3 per cent. In the main division of this group (A), the tonsillar cases, there were 20 deaths in 70 cases, or a mortality of 28 per cent. Considering the nature of the operations, this cannot be regarded as an excessive mortality, but if we look into the causes of death we shall find that some of them should be avoidable in future. Thus 6 of the 20 cases died of hæmorrhage; 4 of these after ligation of the external carotid artery, 1 of the common carotid, and 1 from hemiplegia after ligation of the common carotid for hæmorrhage. A seventh case also died from hemiplegia from ligation of the internal carotid at the time of the operation. In 1, and possibly 2 of my cases also, the ligation of the carotid had much to do with the patient's death. Thus in 8 or 9 of the 20 deaths the cause lay in interference with the large vessels. This is a valuable lesson, and it seems to me that in this respect the mortality in future ought to be distinctly reducible. Of the 20 deaths, 8 or 9 had also to do with septic trouble, chiefly septic pneumonia. How far we can reduce this cause of death in future it is difficult to say; preliminary tracheotomy is not, as I have already pointed out, an absolute safeguard against this accident. In the total 91 cases belonging to Group II, at least 15 deaths were due to septic causes equal to 16.4 per cent. Although this occurrence is I fear in some cases unavoidable, still I think much can be done to prevent it, and I look forward to a reduction of the mortality from this cause also. On the whole, therefore, I believe that if the lessons derived from a study of the work done in this department of surgery are borne in mind, there will be a marked reduction of the mortality in future. One difficulty in improving the result both as regards mortality and also as regards the eradication of the disease has been the limited experience of individual surgeons owing to the small number of cases operated on, and to the hopeless view which is generally taken of them by those who see them first. I was much struck by an expression used in one paper with regard to Billroth's great mortality after pylorotomy, that it represented the "*Lehrgehd*" or educational expenses of the operation. In these pharyngeal operations individual surgeons have had so little opportunity of operating, that their efforts may be looked on as altogether "*Lehrgehd*," and we have not yet got beyond the educational stage. I hope that the lessons derived from a study of the cases which I have collected will enable us in future to pass the educational period, and in that case it is certain that the mortality

will fall, and the success will increase in these as it has done in other operations. Even with the present mortality, however, these operations are fully justified, and occupy as good a position as many others which are looked on as perfectly legitimate procedures.

When we come to Group III we find a much more serious state of matters, for here of 58 cases 32 died, giving a mortality of 55 per cent. Of these, the chief cause of death was septic pneumonia, which led to 19 of the 32 deaths, that is to say, of the total number operated on 32.7 per cent. died of septic pneumonia. How far this might be reducible in future is a difficult question, but I think considerable improvement would follow from freeing the divided end of the trachea, and stitching the skin all round it so as to isolate it altogether from the pharynx.

(B) *Ultimate Results*.—In the whole list of cases there are only 4 which come under the class cured, that is where three years have elapsed without recurrence; but more may have now passed the limit, for as a rule the cases have been published soon after the operation, and there are no further notes of them. Thus it happens that of the 114 cases in the first two groups, no fewer than 24—or, including operations after recurrences, 30—recovered from the operation; but the further history, at any rate after six months, is not recorded. Some of these may have been cured, or at any rate a considerable time may have elapsed before recurrence. Similarly, in 14—or, including operations after recurrences, in 17—more than six months had elapsed since the operation without recurrence. It is, therefore, very difficult to arrive at definite conclusions as to the ultimate result in these operations; but I have attempted to do this by estimating the cases which were benefited and those which were not, the estimate in both instances—especially in those benefited—showing, however, the worst result. Under those "not benefited" I have placed those which died or recurred early; under "benefited" those which recurred late or which remained well at the last note, more than six months after the operation. Those in which further notes are wanting do not come under either group; but most probably, if the further result were known, they would decidedly increase the number of those "benefited;" hence, as I say, the latter class is certainly considerably underestimated, especially in Group II. Letting it stand so, however, we find—as summarised at the end of the table—that in Group I 30 per cent. were not benefited, 52 per cent. were benefited, and 18 per cent. remain which we cannot classify; in Group II 54 per cent. were not benefited and 17 per cent. were, while as many as 29 per cent. have to be left out of consideration; in Group III 81 per cent. were not benefited and 12 per cent. were, while only 7 per cent. are unclassified.

I feel sure that with this accumulated experience before us the mortality can be considerably reduced, certainly in the second group, and possibly also in the third; while there is undoubtedly much scope for greater care and thoroughness in operating, more especially as regards the glands, some of the operations, as will be evident, having been very imperfectly performed. Hence I look forward not only to less mortality, but also to distinct improvement as regards recurrence. As regards Group I, there can be no question as to the advantage of operation, but with regard to it I would point out that several of the cases would have had a much better chance had the operation been more extensive and had they thus come into Group II; and in several of those benefited the result was due more to good luck than to good management. I hope the favourable results shown in this group will not induce surgeons to treat cases in this way which ought to be more thoroughly dealt with. As regards Group II, I think the result is encouraging, for a mortality of 29 per cent. and a mortality which is evidently reducible is not such as to deter us from giving these patients a chance. Here the present results are that 54 per cent. were not benefited, but that is not more than in many statistics of breast cancer, and not so much as in rectal and intestinal cancer, which are generally recognised as suitable cases for operation. Of these cases the most unfavourable are those where the disease has spread on to the tongue, and it is in these instances that most cases of septic pneumonia have occurred, the numbers being 36 cases where the tongue was involved, with 12 deaths or 33 per cent., of which 7 were from septic pneumonia; 4 of these 12 deaths

were, however, from hæmorrhage, and were probably avoidable.

When, however, we come to Group III, we have a very different state of matters, for not only is the mortality very high (55 per cent.), but the proportion of those who cannot be reckoned as having got any benefit is very large (81 per cent.). I think, therefore, that in most of these cases the patients will be better off if left alone. At the same time, in a small proportion (12 per cent.) benefit was obtained, and therefore I would not necessarily exclude all these cases from operation, but would leave it to the surgeon to judge in the individual case whether an operation is feasible or not.

As to the functional result in the first two groups, it is for the most part quite satisfactory. It is remarkable how much one can take away in the tonsillar region without causing any great contraction or inconvenience; on the other hand, where pharynx and larynx are both removed, life is hardly worth living, except in rare instances—certainly it is not in the case of a poor patient who would have to spend the remainder of his days in the workhouse.

3. INTESTINAL CANCER.

I shall confine my remarks to cancer of the rectum. Up till now I have been speaking of cancer in parts where practically the only object in operation was with the view of curing the disease; but here we have a region where on the one hand the conditions as regards cure are not so favourable, while on the other, alternative procedures have to be considered which, while they do not aim at cure, often prolong life markedly, and what is more, remove a great deal of the agony of the disease.

In cases of intestinal cancer we have to do with a disease which, as elsewhere, varies much in malignancy, but is, on the whole, less malignant than cancer in the situations which we have been considering. More especially is this true as regards the glandular and metastatic deposits, in which the disease sometimes progresses very slowly, and if only the risks attending the situation of the primary disease can be avoided, the patient may, in the less malignant forms, live for a very considerable time. In accordance with this lesser malignancy, recurrences after operation are not uncommonly late, a considerable proportion taking place after several years. Thus in Czerny's statistics, 10 were well after three years, but 4 of these (40 per cent.) subsequently showed disease. Metastases are also late in occurring, and as regards the latter point, Iversen states that in 47 *post-mortem* examinations of long-standing cancer of the rectum (he does not say of how long standing), he found 21 in which there were no metastases. As regards the hope of cure, however, the glandular area is not nearly so accessible as in the breast or the throat, and therefore, when the disease is of the rapidly advancing form, there is little chance of getting beyond it by operation. Hence the radical operation cannot be so thorough, and were it not for the fact just mentioned as to the lesser malignancy of the disease, the chances of benefit by removal of the disease would be very slight. Further, the operations necessary for the removal of the primary disease, more especially where it is high up, are accompanied by a considerable mortality. And lastly, the functional result after operation often leaves much to be desired, both as regards continence on the one hand, and stricture with its troubles on the other. On the contrary, we have in colotomy an alternative procedure which removes the immediate risk to life (obstruction), and thus prolongs life often very considerably, while it also rids the patient of much of his pain and discomfort, by relieving the impending obstruction and by getting rid of the inflammatory condition at the seat of disease, which not only adds much to the patient's discomfort, but also no doubt increases the rapidity of growth of the disease.

Thus we have in these cases a choice of procedures, and it is no longer, as in the former instances, a question of a radical operation or nothing; and further, as the palliative procedure offers much relief, and as only a small proportion of radical operations give any hope of permanent benefit, there is not the same urgent need for the radical operation. Hence the question of selection of cases and our mode of advising the patient is much altered. We shall find that in a large proportion of cases the hope of benefit from a radical

operation is so very slight that we can, without hesitation, exclude them from the radical procedure and at the same time help them much by colotomy; and thus the cases in which the choice of an operation has to be left to the patient are comparatively few. We can in most instances say definitely that the case is suitable for the one or the other procedure; there are only a few on the border line that we need leave to the patient to decide.

Let us contrast the results after colotomy with those after excision. At one time colotomy was of itself an operation with a considerable mortality, and when performed during an attack of obstruction it is so still. At the present time, however, especially as regards inguinal colotomy, the mortality is quite insignificant when performed apart from obstruction—probably not more than 2 or 3 per cent., if, indeed, so much. We may, in fact, disregard the primary mortality of colotomy and study the results as regards prolongation of life. There are not many good statistics on this point. Erckerlen's old statistics give 45 cases surviving the operation, of whom 22, or 49 per cent., died within a year and 23, or 51 per cent., lived more than a year, 6, or 13 per cent., living over two years. Bryant's statistics are much more favourable. Taking all the cases which survived the operation (125) together we find that 36, or 28 per cent., died during the first year, 43, or 34 per cent., died during the second year, 28, or 22.4 per cent., died later than two years, and 18 were still alive when he published; some of them also having lived more than two years. These results are, however, remarkably favourable, much more so than any other published estimate. The explanation may, in part at any rate, be that at the present time in a good many of these cases the disease would have been excised, and only the more advanced and malignant cases would have been subjected to colotomy. At the present time, therefore, cases treated by colotomy do not live on an average nearly so long, most of them dying during the first and second year. In a case unsuitable for the radical operation, however, I performed colotomy nearly five years ago, and the patient is still alive, although in the interval a small communication has formed with his urethra.

Let us turn now to the results of the radical operation. The mortality varies considerably between the perineal and the sacral operations, being naturally higher for the latter. König's total mortality is 38 per cent., Billroth's 34 per cent., Kocher's 28 per cent., Albert's 18 per cent., Iversen's estimate as regards the Kraske operation 25 per cent., and Czerny with the perineal operation 3.4 per cent., with the sacral operation 19.4 per cent. So far as one can judge from a large number of reports, the mortality after the perineal operation seems to be about 8 per cent., after the sacral operation from 18 to 20 per cent., but the results vary much in the hands of different surgeons, probably in accordance with the selection of cases and the after-treatment of the wounds, and in both instances it can in all likelihood be somewhat reduced in the future. As matters stand, however, we have to contrast colotomy, in which the mortality is practically *nil*, with excision, where the mortality varies from 5 to 20 per cent.

Let us next consider the results, and I shall not weary you with elaborate statistics, but take as examples three papers in which the cases are detailed, and which therefore I have been able to control and work out myself. I had intended to inflict another table on you, and my friend, Dr. Macan, has spent a good deal of time in hunting up results for me, but as I found that I had no time to go at all fully into the matter, I gave up the project.

[Several results were then referred to, making 100 cases in all, where a considerable time had elapsed since the operation.]

Of these 100 cases 61 were no better off than if they had been left alone, and not so well off on the whole as if they had had colotomy done, for 27 of them died at once. These results are not in any way better, indeed not so good as in the pharynx operations. On the other hand, 33 gained advantage, and most of them very marked advantage from the radical operation, much greater than colotomy could have given. From this we see that of every 100 cases subjected to the radical operation in Germany only about 35 are really likely to be benefited by the operation, 60 would be better off with colotomy, for in Germany the radical operation is carried to an extreme extent, adhesion to bladder and prostate

not even forming a contraindication; indeed, Genzmer goes so far as to advocate the operation even though there are already metastatic deposits in the liver. As even in Germany about 20 per cent. to 25 per cent. of the cases applying for relief are not deemed fit for the radical operation, we may say that taking all patients together as they come to the surgeon, not more than 20 per cent. will be benefited by the radical operation; the remainder will do better with colotomy. If we study the successful cases, it appears that in the great majority of instances where real benefit was derived from the operation, the disease was low down, and was not adherent to the surrounding structures. The cases of success as regards prolonged freedom from recurrence where the disease was high up or adherent to surrounding structures, such as the prostate, are quite few in number.

In this matter I quite agree with the tendency of the English school of surgery as opposed to the German, and would exclude from the radical operation cases of rapid growth, cases where the disease forms large masses in the intestine or is deeply ulcerated, cases where it has passed through the wall of the rectum and invaded surrounding parts, as indicated by fixidity, and rapidly-growing tumours high up, even though not yet fixed. In none of these is there any real prospect of cure or of marked prolongation of life. In the fixed tumours local recurrence is almost certain to take place early, and the last condition of the patient will be worse than the first; where the tumour is rapidly growing glandular infection is widespread, and the chances of getting beyond the disease are very remote, while, on account of the rapidity of growth, the glandular disease and the metastatic deposits will soon end the life of the patient. In none of these cases is it worth while for the patient to run a considerable risk, for it is just in these cases that the mortality is highest, while in colotomy we have a means of relieving the patient's sufferings, and of giving him as long a period of life with practically no risk.

THE MILROY LECTURES

ON

THE VALUE OF ISOLATION AND ITS DIFFICULTIES.

Delivered before the Royal College of Physicians of London.

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[ABSTRACT.]

LECTURE II.

THE VALUE OF ISOLATION AS ILLUSTRATED BY SMALL-POX.

AFTER a rapid review of the improvement in sanitary conditions which had resulted from the Public Health Act of 1872, and the Compulsory Notification Act (which already applied to five-sixths of the whole population), the lecturer proceeded to deal with the effect of isolation as exemplified by small-pox in particular. He referred to the investigation conducted by the Local Government Board in 1880-81, giving in full the results of Dr. Thorne Thorne's inspection of isolation hospitals, and of Mr. W. H. Power's inquiry into the connection between small-pox hospitals and the incidence of the disease in the immediate neighbourhood of these institutions (on which the official doctrine of "aerial convection" is founded) together with the gist of the findings of the Royal Commission, consisting of Sir J. Paget, Sir R. Alcock, Professor Burdon Sanderson, Sir W. Broadbent, Mr. Jonathan Hutchinson, and Dr. Alfred Carpenter, appointed to study the whole matter. On the question of aerial dissemination the Commissioners did not see their way to a positive conclusion. Dr. Seaton proceeded:

OBJECTIONS TO THE THEORY OF AERIAL CONVECTION.

While fully recognising the merits of the famous inquiry of 1881, the following points must, I think, still be left open to question:

(1) The possibility, under the circumstances of 1881, of absolutely excluding the other chances of infection in the

case of persons attacked in the month of January. (Several of these, it will be remembered, were outside the half-mile radius. It would certainly have been said before 1881 that there was not even the most remote possibility of their infection at such a distance.)

(2) Assuming the possibility of distal—that is, long distance—infection, what are the probabilities of such a method of infection, as compared with the probabilities of proximal—that is, close distance—infection? (meaning by the latter term the infection which takes place in ordinary personal communications).

(3) Is "distal infection" a dominant factor in the spread of small-pox?

With regard to the first point, I have already expressed my own views.

As to the last point, it would seem from the publications which have been chiefly in evidence of late years, that this was seriously contended for. I will not attempt to follow out this point argumentatively; it seems to me to lead to conclusions which are absolutely absurd.

As to the probability of distal infection, it rests with those who strongly uphold it to indicate its proportions. If we were to judge from the frequency with which this source of possible danger is referred to in the official medical prints, we might be led to conclusions which are very erroneous. It is quite remarkable how, in subjects relating to the public health, an account of an interesting and exceptional outbreak described or referred to over and over again in the officially recognised sources of information, gives rise to the impression that the occurrence of such outbreaks is common. I could offer many illustrations of this fact, derived from my experience as an examiner. We must, therefore, be very careful to distinguish a belief which is due to an impression from that which is the result of a careful study of the facts upon which the statement has been based.

ISOLATION AND THE DIMINISHED PREVALENCE OF SMALL-POX.

I turn now to the experience of the last decade, which seems to be the best corrective of any false impressions which might arise on this vitally important subject. The recommendation of the Commission in 1882 may be given in their words:

We think it right thus to report the chief grounds for accepting or rejecting the theory of distant atmospheric dissemination of small-pox. But we feel that long as it is not proved that "personal communication" is adequate to the explanation of the whole spread of small-pox, and so long as a distant atmospheric dissemination is not shown to be in the highest degree improbable, so long it is essential that in the construction and management of small-pox hospitals both sources of danger should be with the utmost care guarded against. And in this conclusion we are more than supported by the opinions of witnesses of the greatest authority, including Sir William Jenner, Sir William Gull, Sir James Risdon Bennett, and Sir John Simon.

Those recommendations have led to the adoption of the present system of isolating small-pox, that is to say, by the taking of the cases as they occur "out of" the population, and removing them to a distance of several miles to a spot where true isolation could be carried out. Looking back upon the state of things before 1886, at which time this system came into operation, and comparing it with what has happened during the ten years which have elapsed, we have, so far as facts and figures go, one of the most remarkable instances on record of the efficacy of any medical preventive measure. I would repeat the words "so far as facts and figures go," for we do not need to go beyond the history of small-pox itself to find illustrations of conclusions which, as subsequent events proved, were too hastily adopted. Still, as far as we are warranted in basing any opinions at all on mortality statistics, this would certainly seem to be one of the most remarkable pieces of evidence which has ever yet been adduced in support of the efficacy of any preventive measure. For even if it be argued that distal atmospheric dissemination played a dominant or even an important part in the maintenance of small-pox in London in such proportions as caused it to be spoken of as epidemic, we have now the incontrovertible fact that a hospital segregation of cases at a distance has resulted, for a time at least, in a comparative extinction of the disease.

All questions of distant atmospheric dissemination apart, does it not seem as if the whole subject resolved itself into a question of notification with *true isolation*—that is, the removal of cases, as Mead advised nearly two centuries ago, to a distance of some few miles out of the town? The