to Dr. Stone that an alternating current might be expected to show too low a resistance, because of the electro-chemical capacity of the body which it would treat like conductivity. 4. There was, probably, also considerable self-induction, a term which he was free to confess involved much difficulty.

Self-induction.—The possibility that self-induction played a considerable part in the actions now under consideration, was very strongly brought to mind by the highly suggestive Presidential Address, delivered by Professor Hughes to the Society of Telegraph Engineers and Electricians, on January 28th, 1886. Professor Hughes had sketched the history of the discovery of self-induction in the following words. "Induced, or secondary currents, in a near but independent circuit, were discovered by Faraday in 1831; and the phenomenon of the self-induction of an electric current in its own wire, was observed by Henry in 1832, and traced to its cause in 1834 by Faraday, who proved that, on sending a current through a wire, a momentary induced current, in the opposite direction, is evoked in its own wire; also that, on the cessation of the primary current, a second induced, or 'extra current' is excited in the direction of the primary. The effect is greatly augmented when the wire forms a coil, as we then have, in addition, the reaction of superposed currents; but the effect exists to a great extent, even when the wire forms but a single loop, or a straight wire with the earth forming the returning portion of the loop, as in all telegraph lines."

Dr. Stone said that, though there was still some controversy as to the mathematical interpretation of the facts brought forward by Professor Hughes, he believed that they pointed to a new direction, in which research might be prosecuted by physiologists. Professor Hughes divided the current into stable and variable periods; the continuous current was in the stable, the alternated and interrupted in the variable period. It was in the latter that induction took place. Instead of the time-honoured Neef's hammer of the induction-coil, Professor Hughes employed his own invention, the microphone, or a small contact-breaking clock. This allowed the use of the ordinary meter-bridge for measuring resistance, in combination with the sonometer, by which means not only resistance, but self-induction could be measured.

A straight meter-bridge, with a platinum silver-wire, and two sliding contacts, was shown, joined up with the latest form of the Hughes sonometer, consisting of two concentric coils of wire, on cylindrical bobbins, the inner being movable round an axis passing through the diameter of the outer coil. When the two coils were at right angles to each other, a pointer, attached to the inner one, indicated zero, there being no self-induction between them in this position. The connections formed a most ingenious combination of the meter-bridge with the sonometer. A current, slowly interrupted by the contact-breaking clock, was then passed through a standard resistance, and through the same man as had been before experimented on, the series of telephones distributed about the room still acting as sensitive galvanometers in the bridge. Approximate silence was obtained in the telephones by means of the sliding contacts, which was rendered complete by rotating the moving index and coil of the sonometer, until an equal and opposite amount of self-induction to that of the human body had been introduced.

With this instrument, which had only recently come into his hands, Dr. Stone hoped to be able to balance resistance and self-induction separately; but, as yet, the time during which it had been at his disposal had been too short to allow him to arrive at complete measurements. The method of using the instrument was, however, successfully demonstrated.

General Considerations.—In bringing his lectures to a conclusion, Dr. Stone expressed his conviction that there was a great field open for research in this direction. The whole foundation of physiological electricity required to be strengthened and re-examined. It was, indeed, a stately building, but its physical basis was unsafe, and, until this was made firm, the entire superstructure was in danger. If this work be done, many precious discoveries would doubtless be made in the course of the necessary explorations. Already the analogies between nerve-force and the great physical force were growing strong. One such analogy relating to inhibition had been published in *Nature* by Dr. Lauder Brunton. Another analogy Dr. Stone had ventured to suggest, in a speculative way, in his syllabus, by comparing the human nervous system to a duplexed telegraph-cable, in which a transmitted impulse was balanced and inhibited at the sending-station, but unbalanced and exhibited at the receiving-station.

Therapeutic Possibilities.—There were not wanting indications, from several directions, that electricity might be hopefully applied in various diseases. Its use in muscular enfeeblement from lead, and in other metallic impregnations, and the so-called "refreshing action"

of the current, were well known. Neuralgia could sometimes be cured by its use, a fact illustrated by the case of sciatica, reported in Lecture II. Here, he believed, the electro-chemical production of alkaline bases in the tissues occurred. It was of use, too, in certain other diseases of the nervous system, in locomotor ataxy, and in progressive muscular atrophy. In these diseases, its favourable influence was due, not only to its direct action, but also to its power to loosen chemical affinities, and to render more active alteratives administered by the mouth. Dr. Stone had been able to demonstrate that, under its influence, copper, mercury, and, perhaps, silver, administered by the mouth could be eliminated. Its hypnotic properties had been tested by so good an observer as Colonel Bolton, who had informed Dr. Stone that a constant current passed from head to hand never, in his own case, failed to produce sleep.

Conclusion.—After finally insisting upon the necessity for accurate measurement in the use of this therapeutic agent, Dr. Stone, in a few brief sentences, expressed his gratitude to the President and Censors of the College of Physicians for giving him an opportunity of demonstrating and explaining his views on a subject, at which he had worked for over five years; to his colleagues, for their kindly presence and intelligent interest in his experiments; to distinguished men from outside the College, like John Marshall and Sir Henry Mance, who had honoured him by their attendance and advice. He proposed to conclude by saying farewell in a time-honoured formula, and, following an ancient custom of the place in which he spoke, in the Latin language, "Dixi, dignissime Præses, quod felix fanstumque sit huic Collegio. Vos socii cæterique omnes valete et plaudite."

TWO LECTURES

ON

TUMOURS OF THE LARYNX; THEIR PATHOLOGY, SYMPTOMS, AND TREATMENT, WITH ILLUSTRATIVE CASES.

Selected from a Course of Lectures delivered during the Winter Session of 1885-86 at the Glasgow Royal Infirmary.

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LECTURE II.—(Concluded from page 816).

I now pass to consider the question of prognosis, and, in doing so, I shall divide the subject into two divisions: first, the prognosis in benign tumours; and second, in malignant. In pre-laryngoscopic times, the fact of a tumour being malignant or not was not of the same importance to the patient as it is now; because, in former times, if the tumour had a tendency to increase to such an extent as to cause obstruction to respiration, death was almost certain to result, whether the tumour were of one class or of the other. Previously to the middle of this century, there were few cases of successful extirpation of benign tumours, and surgeons looked upon all tumours of the larynx as clinically malignant. Certainly this was true, from a strictly clinical point of view, in so far that they were almost certain to lead to the death of the patient. Now, however, the tumours which I have described as benign, may be removed without much danger to the patient; hence the prognosis is favourable, as a rule, in non-malignant neoplasms. In respect to benign growths, the points necessary to hold in view in forming an opinion in respect to the future are, first, the age of the patient; and, secondly, can the growth be removed by the endolaryngeal method?

In children, the prognosis is less favourable than in the adult, partly because the diagnosis is not so easily made, and also from the fact that manipulation within the larynx is more difficult; so that, in the majority of cases, if the tumour is to be removed, the extra-laryngeal method must be adopted. Again, during the earlier years of life, the larynx is so small, that a tumour of trivial size may cause complete obstruction to respiration. It also must not be forgotten, that at this period the laryngeal mucous membrane is more prone to acute inflammation and spasm, than in the later years of life. After what I have just said, I will eliminate, for the sake of simplicity of description, cases of benign tumours in children; the following remarks apply to adults. Two questions must be considered: the rela-

tion of the tumour to the life of the patient, and the probability of phonation being impaired or not. First, in relation to life; the danger of death resulting from suffocation may be easily obviated by the performance of tracheotomy, an operation which in itself, apart from co-existing pulmonary or cardiac disease, is almost free from danger, so that a patient should never lose his life from interference to respiration, so long as he is under the care of the surgeon at a sufficiently early stage of the disease. Should, however, the patient refuse to submit to tracheotomy, the danger of suffocation may be considerable. Tumours situated below the vocal cords or multiple sessile tumours are less favourable than single pedunculated growths. Again, large tumours are necessarily more grave than small ones; but the point which above all others determines a favourable or unfavourable prognosis is whether or not the removal of the growth necessitates the larynx being opened from without. The general health of the patient, but especially the condition of the heart and lungs, must be held in view. The prospects as to the recovery of the voice are determined by the character, the situation, the size, the number of the tumours, and the amount of inflammatory induration associated with them, and whether the neoplasm can be extirpated through the mouth or not. When thyrotomy is required, not only is the danger to life increased, but the chances of the vocal function being impaired or lost are very great. If the growth be situated at the upper part of the larynx, especially anteriorly, if it be single, small, and pedunculated, it can be removed, and in all probability the patient will recover the full use of his voice; but if the growth be sessile, multiple, not clearly defined from the surrounding tissues, and if important parts of the larynx be involved in its substance, then the likelihood of the voice being restored after the tumour has been removed is small. In many cases, the inflammatory induration of the mucous membrane accompanying tumours gives rise to considerable alteration in the character of the voice, but it is astonishing how rapidly this may disappear after the growth has been extirpated. It is not necessary for me to say anything to you regarding the danger of recurrence. To this I have already referred in my description of the various tumours, and I shall have something to say about it when considering operative interference.

In relation to the life of the patient, the prognosis of malignant disease is in all cases unfavourable, but is worst in extrinsic carcinomata, most favourable in intrinsic sarcomata, while the intrinsic carcinomata may be said to occupy an intermediate position. In extrinsic cancer the disease is incurable, the growth spreads rapidly, the lymphatic glands become involved at an early date, and the patient is liable to die either from suffocation, from asthenia, from hæmorrhage, from sudden collapse, or from pyæmia; or the fatal termination may be induced by perforation of the œsophagus, by the formation of abscesses, or by pulmonary disease. If tracheotomy have been performed at the proper time, life may be prolonged, and suffering for the time be mitigated, but more heroic surgical interferences in cases of extrinsic carcinomata, offers little or no hope of success. Although the prognosis is very unfavourable in all cases of cancer, it is much less so in intrinsic than in extrinsic growths. When the tumour is small in size, and none of the tissues external to the larynx have become involved, the hope of rescuing the patient from death is considerable. If, however, the disease has spread beyond the limit of the laryngeal cavity, or if the glands have become affected, then a tumour, which at first may have been intrinsic, becomes quite as hopeless, as far as operative interference is concerned, as if the growth had been extrinsic from the beginning.

Throughout this lecture I have discussed the facts in connection with laryngeal neoplasms, under the two heads, according as they are malignant or benign; but, in bringing under your notice the treatment of tumours, I shall depart from this classification, and, for obvious reasons, discuss the question of treatment under the following heads: first, palliative; and second, operative treatment. I shall divide the latter into three classes, (a) endolaryngeal operations, for the destruction or extirpation of growths, (b) extra-laryngeal operations, and (c) extirpation of the larynx in whole or in part.

There are two classes of cases which call for palliative treatment; small growths causing little disturbance further than local irritation, and malignant tumours, where operative interference for their removal is considered inadvisable. The principal symptoms which call for relief are interference with respiration or with deglutition, and the presence of spasm or of inflammation. When there is much pain, it may be relieved by spraying the fauces and larynx with a solution of cocaine, or by insufflation with morphia and starch, or by inunction with an ointment containing morphia. The danger of death from suffocation may be removed by the timely performance of tracheotomy; and, in cases which demand this operation, it should be performed as soon as

possible. Opening the trachea is not in itself a dangerous operation, and, in my opinion, should be resorted to whenever there is the least indication of dyspnoea, especially if the surgeon be not likely to be at hand when he may be required. It is remarkable how much relief a patient derives from the rest to the larynx, when the air ceases to pass by its natural channel.

In advanced cases of malignant tumours, or when large benign tumours occupy the upper portion of the larynx, dysphagia becomes a marked and troublesome symptom. In the former cases, the only treatment you can adopt is to insufflate the larynx with powder containing morphia, or by the use of a spray of cocaine, both of which only give temporary relief. The treatment of spasm of the larynx arising in connection with tumours must be conducted on general principles; but, as a rule, nothing short of removal of the growth will give permanent relief.

With these few remarks on palliative treatment, I will pass to consider the methods which may be adopted for the removal of tumours; and I may premise what I have to say, by urging upon you the importance of removing growths at the earliest possible opportunity. There are doubtless many cases where a tumour may exist for years without causing any disturbance, and I know of at least two cases where a neoplasm must have existed for a considerable time without the patients being cognisant of the fact that there was anything the matter. Indeed, it is urged by some writers that, so long as a tumour does not cause trouble, it should be left alone; this seems to me a dangerous doctrine. Not only is it easier to remove a small growth than a large one, but the probability of removing the former without injuring some important structure is greater; and, moreover, there is always a certain amount of danger, especially in old persons, of a tumour, in its early stages homologous, becoming in its later development heterologous. In other words, a tumour which at one time followed the type of a benign growth, may, at a later period, show evidences of malignancy. Doubtless, certain growths, such as the fibromata, after they reach a definite size, remain quiescent; and, if they be situated in the upper third of the larynx, they may interfere so little with the voice, that the patient may not be anxious to have them removed.

Suppose you discover a tumour, and the patient refuse to have it removed, it is clearly your duty to represent to him that, if he allow it to remain, there is always the danger of sudden, and sometimes serious, dyspnoea arising, in consequence either of increase in the bulk of the growth, or of some intercurrent affection, such as acute laryngitis, œdema, or spasm; and also, you must explain to him that at no time will the growth be more easily removed than at present.

Radical treatment is preferable to palliative, and may be carried out by a great variety of methods. These may be divided into groups, according as the operation is performed, by aid of the laryngoscope, through the mouth and natural passages, or by means of incisions through the skin, cartilages, etc. I will, therefore, classify operations under the following divisions: endolaryngeal, extralaryngeal, and extirpation of the larynx in whole or in part.

The first class of operations requires considerable practice and dexterity on the part of the surgeon, and some patience and assistance from the patient. Before attempting any of the methods I am about to describe to you, it is necessary that you should first educate your patient to sit in a proper position, and perfectly steady, while you are manipulating the parts; and you must also teach him to hold out his tongue in the proper way. He must also avoid swallowing, coughing, or retching. I will now perform the operation upon one of the patients whom I have brought from the ward, and I will explain to you as I go along what I am doing. Before this man was brought into the lecture-room, my assistant, Dr. Keogh, sprayed the larynx several times with cocaine; and you will see, when I pass this probe, heated in warm water, into the larynx, that I can touch the tumour without causing any discomfort. The growth, a portion of which I am now going to remove, is a large one, and almost completely fills the upper third of the larynx. The instrument I have selected is Morell Mackenzie's antero-posterior spoon-shaped cutting forceps; and you will see that, with them, I can remove a considerable portion of the growth. They are warm, so as to prevent the metal from causing irritation. With the assistance of the laryngeal mirror, I now pass the forceps over the epiglottis, lay hold of the tumour, and, with a little force, cut through its substance. You see I have now removed three pieces, and the hæmorrhage prevents me from seeing the remainder of the growth, so that I shall now send the patient back to the ward, and in a few days I will repeat the operation.

Besides using forceps, growths may be extirpated by means of instruments, such as those which I now pass round for your inspection. That to which I first ask your attention is Schroetter's guillotine and

forceps; but they are not instruments which I would advise you to employ, for this reason, that the guillotine has no grasp of the portion of the growth cut off, and, when the larynx is anaesthetised, there is always a danger of the separated piece dropping down into the lower part of the larynx or trachea; and moreover, as far as my experience goes, the hemorrhage following their use is more profuse than when cutting forceps are employed.

In place of these forceps, tube-forceps, such as those I hold in my hand, may be used. Türk's, Schroetter's, and Stoerk's forceps are of this variety; Fauvel's and Mackenzie's are branched forceps; whereas Gottstein's combine the movements of both instruments. The disadvantage of the tubular forceps is that they do not grasp the growth firmly, and, therefore, when considerable force is required to remove the neoplasm, they fail in their purpose; whereas, on the other hand, branched forceps, such as Mackenzie's, although they seize the growth with firmness, have the disadvantage that, in opening them within the larynx, they partly cover the field of vision at the very time when it is desirable to have a clear view of the parts. To some extent, Gottstein's forceps obviate these difficulties.

I have now shown you two sets of instruments, namely, forceps and guillotines; but, besides these means, others may be adopted according to the requirements of the individual case. These I shall glance at only for a moment.

Small growths may sometimes be destroyed by the application of chemical agents, such as chromic acid, nitric acid, acid nitrate of mercury; these, however, require very delicate manipulation, and, unless skilfully used, are apt to lead to unpleasant accidents. Electric cauterisation is greatly to be preferred to chemical, and the cantery which I have shown you to-day is the one that I always employ. I have never found any bad results follow its use, although some laryngoscopists blame it as more apt to cause collateral inflammation than when chemical caustics are used. I have found, however, that when the cauterisation is limited to the neoplasm, which is not, as a rule, very sensitive, no bad results follow its use. Of course, before operating by this method, the larynx should be thoroughly anaesthetised with a solution of cocaine.

Knives, properly curved and guarded, may be used for the separation of growths which may be seized, but not pulled off, by forceps. This method is, however, seldom employed, so that I need not do more than mention it.

Crushing or compression may be found necessary for the purpose of inducing the death of a tumour, which would otherwise require too much force to tear it away.

Wire-snares and écraseurs may be also used. In using such instruments, the wire loop is made to encircle the growth, and afterwards drawn tight, so that the tumour is forcibly pulled or twisted from its attachment. This method is, however, difficult and uncertain in its application; for not only is the wire apt to become displaced, and so lose its hold of the growth, but the manipulation of these instruments within the larynx is very likely to cause considerable local irritation and spasm.

The methods which I would recommend you to adopt are evulsion, or tearing the growth away bodily by forceps, such as Gottstein's or Mackenzie's, or destruction of the tumour by the electric cantery.

Under certain circumstances, for example, when the tumour is large, or situated below the vocal cords, and is inaccessible by the mouth; when the patient is too young to allow endolaryngeal manipulation, or when the tumour is very firmly attached to the surrounding tissues, it may be necessary to open the larynx from without. Extralaryngeal methods should only be adopted when less severe operations have failed or are inapplicable, or when life is in danger from suffocation or obstruction to deglutition.

Extralaryngeal operations include section of the thyro-hyoid membrane; section of the middle crico-thyroid ligament; section of the thyroid cartilage in the middle line; and section of the entire larynx, or of the trachea. Before attempting any of these operations, the surgeon should perform tracheotomy, and make a thorough and diligent endeavour to remove the growth by an endolaryngeal operation, and only when he is convinced that it is impossible, should he attempt any of the operations I have just mentioned; for, if the thyroid cartilage be divided, the ultimate results are not only less favourable than when the tumour is removed by the mouth, but the immediate dangers to life after the extralaryngeal operation are much greater.

The extralaryngeal operations usually employed for the removal of tumours are thyrotomy, and complete division of the larynx. The others I have mentioned to you, especially subhyoid pharyngotomy, permit only a very limited space for manipulation, and their usefulness is therefore very restricted. Mesochondric laryngotomy may be em-

ployed for the removal of small subcordal tumours; it does not interfere with the function of the larynx, it involves very little risk to life, and the cicatrix which follows is hardly noticeable. The only two operations which I will describe to you to-day, are thyrotomy and complete laryngotomy. The latter should only be resorted to when section of the thyroid cartilage fails to expose the interior of the larynx sufficiently.

In performing either of these operations, the patient should be placed on his back, with a firm pillow behind his shoulders and the upper part of his chest, so that the thorax is raised, while the head is thrown backwards, and the soft parts in front of the neck are put upon the stretch. The neck should be held perfectly straight by an assistant, while the operator feels for the thyroid cartilage; and, when the precise situation of the various parts of the larynx have been ascertained, the surgeon should grasp them between the fingers and thumb of his left hand, so as to render the skin moderately tense.

When section of the thyroid cartilage alone is to be performed, a vertical incision should be made in the middle line, from a little above the upper border of the thyroid cartilage to the lower margin of the cricoid. The edges of the wound should be held aside by retractors, and all bleeding points secured before the larynx is opened. The only vessels that are likely to cause any trouble are the crico-thyroid arteries, which are firmly attached to, and anastomose over, the crico-thyroid membrane; if seen, they should be drawn downwards before the membrane is penetrated. A sharp pointed curved knife should now be thrust through the crico-thyroid membrane, and the thyroid cartilage be divided in the middle line from below upwards, care being taken not to injure the interior of the larynx. When completely divided anteriorly, the two halves of the thyroid cartilage should be drawn apart by blunt hooks, and the interior of the larynx exposed to view, when the growth may be removed by scissors, by the knife, by the electric cantery, or by other appropriate means, according to the features of the individual case. Should, however, section of the thyroid cartilage not sufficiently expose the cavity of the larynx, then the incision may be extended downwards through the crico-thyroid membrane, or, if necessary, complete laryngotomy may be performed by subsequent section of the cricoid cartilage. If the growth be firmly attached to the cartilage, the perichondrium should be separated from the part of the cartilage to which the tumour is adherent, and that portion of cartilage excised.

These operations are not applicable when the larynx is occupied by a malignant growth; under such circumstances, either more complete removal is necessary, or the case should be left alone.

When malignant disease attacks the larynx, more complete removal is demanded than is possible by the operations to which I have, up to the present, referred. Laryngectomy, either complete or partial, is called for.

The possibility of an animal living after total extirpation of the larynx was first established by Albers, in 1829, while conducting a course of experiments upon dogs for the purpose of ascertaining to what extent the larynx participated in respiration. Koeberlé, in 1856, suggested the idea of removing the larynx for disease; and, in 1866, the operation was first put into execution by Dr. Patrick Heron Watson, of Edinburgh. The operation was performed for syphilitic stenosis, but the case was not published. It was only in 1871 that the operation was introduced to the profession by Professor Billroth, of Vienna, who undertook it upon man, consequent upon the experimental investigations upon animals by Czerny, of Heidelberg. Up till the present time, complete laryngectomies have been performed over ninety times. In the great majority of cases (eighty), the operation has been performed for cancerous disease. Until recently, the cases have not been carefully selected, and the operation has been performed without regard to the circumstance that the tumour was not limited to the cavity of the larynx. I am firmly of opinion that cancer is primarily a local disease, and this view has been strongly supported at the recent discussion at the Glasgow Pathological and Clinical Society; and so long as the system of lymphatics has not become involved in the new formation, I think it is quite possible that the patient may be rescued from death by the early performance of a radical operation. It is, however, a very different matter when the disease has spread beyond the laryngeal cavity. In such cases, laryngectomy seems to me unjustifiable, for two reasons: the immediate danger of the operation is greatly increased, and the possibility of eradicating the disease is extremely small; but I do not see any reason why an intrinsic carcinoma, which has not yet exhibited any evidence of glandular involvement, should not be removed with a good prospect of saving the patient. It is not my intention at the present time to enter into statistical details, but I think it my duty to indicate to you what I consider to be the elements of failure, and to point

out suitable cases for operation. Looking at the subject broadly, I may say that death has been due, in the majority of cases, to the immediate dangers of the operation, and, later on, to recurrence of cancer. Immediately following the operation, the causes of death are collapse, pyæmia, pneumonia, and hemorrhage. These dangers must, therefore, be carefully guarded against; the first mentioned may be, to some extent, avoided by carefully preventing loss of blood during the operation, and by feeding the patient as soon as he is able to digest food. Pyæmia may be prevented by the free use of antiseptics during the first few days following the operation. Iodoform is the most easily applied, and, if carefully watched, the most satisfactory that we have at our disposal; but the drug, if inhaled, may, in certain cases, cause very alarming symptoms. Therefore, although iodoform may be used to disinfect, or rather to prevent infection of the wound, it is not safe to apply it freely to the tracheal tube by means of warm sponges. The danger of pneumonia, on the other hand, may be minimised by keeping the air of the apartment aseptic, moist, and at an equable temperature. Care should also be taken to prevent any fluid from the wound or food from entering the air-passages; and this can be easily done by using a large-sized tracheotomy-tube, which completely fills the trachea. The period when pneumonia is apt to develop is during the first fortnight. This time bridged over, the life of the patient may be regarded as safe from this complication.

The mortality from the operation is high in cases of cancer; whereas, in cases of sarcoma, not a single patient has died from the immediate effects of the operation. One reason for this is, that cancer is essentially a disease of old age; and, moreover, in many of the cases recorded, laryngectomy has only been resorted to as a last resource.

I am clearly of opinion that, when surgeons make up their minds to operate upon cancer of the larynx, either by total or by partial extirpation, at the earliest possible stage of the disease, namely, as soon as they are satisfied that they are dealing with a case of intrinsic cancer, the statistics of laryngectomy will be greatly improved.

Up till the present moment, I have only referred to the operation as applied to cases of carcinoma. At an early part of the lecture, I told you, while speaking of the prognosis in relation to life in cases of malignant disease, that the prospects of long life are worst in extrinsic carcinomata, more favourable in intrinsic sarcomata, while the intrinsic carcinomata may be said to occupy an intermediate position. In the first mentioned condition, the disease must be regarded as incurable, and the question of performing laryngectomy should not be considered. (The patient whom I showed you to-day, D. McK., comes under this category.)

I had the privilege of assisting the late Dr. Foulis in operating upon a case of sarcoma in the larynx. The operation was performed in September, 1877, and the patient lived till March, 1879, when he died of tracheal and pulmonary phthisis, a disease from which he was suffering previously to the operation. Up till the time of his death, there was no evidence of recurrence; so that, if he had not been the subject of tubercular disease, the probability is that he would have been alive now. In sarcomatous disease, death is certain, unless extirpation be performed; but, if the diseased tissues be entirely removed, the prognosis is rendered favourable.

Laryngectomy has been performed for sarcomata five times; by Lange, Czerny, Foulis, Caselli, and Bottini. The patient of the first mentioned surgeon lived for nearly seven months, in which case the disease not only involved the larynx, but also the gullet. The second was a lymphosarcoma, perforating the thyroid cartilage, and involving the neighbouring glands. The latter were removed repeatedly; the common jugular vein, the internal and external carotid arteries, and the pneumogastric nerve, were divided; and the patient died in high fever, with right-sided pleurisy, fifteen months after the primary operation. These two cases were clearly unsuitable for operative interference. Of the three remaining—namely, Caselli's, operated upon in September, 1879; Bottini's, in 1875; and Foulis's, in 1877—two are still alive. That of Foulis died of phthisis, seventeen and a half months after the operation. These cases, though few in number, indicate far more satisfactory results than we can find in connection with carcinomata.

The other diseases for which laryngectomy has been performed, are papillomata, lupus, perichondritis, and stenosis. In some of these, no doubt, the operation was undertaken with the mistaken idea that the disease was cancer; otherwise, it is difficult to comprehend why such a radical measure for the cure of disease, which might be easily remedied by less heroic treatment, should be adopted.

I now come to consider the conditions in which extirpation of the larynx may be undertaken with advantage. In no non-malignant growth is it called for; but it may be resorted to in intrinsic sarcoma, and in intrinsic cancer. Laryngeal carcinomata are, as a rule, intrinsic

for a considerable period, and, therefore, the time during which the operation may be performed with advantage is considerable; but, notwithstanding, it is of the utmost importance that, if the operation is to be performed at all, it should be undertaken as soon as the disease has been recognised. When the malignant disease is associated with infiltration of lymphatic glands, or if the primary tumour be extrinsic, or if there be persistent bronchial or pulmonary catarrh, the operation is contra-indicated; for, if it be performed in such cases, not only may the patient be deprived of the small remnant of life left to him, but the chances of eradicating the disease are very remote. Cases are on record in which, besides the larynx, portions of the thyroid gland, of the trachea, œsophagus, or pharynx, have been extirpated; but the results are far from encouraging, not only on account of the immediate dangers of the operation, but also from the fact that recurrence takes place within a limited time.

In a few instances, half the larynx may be removed in place of the entire organ; for example, in malignant tumours of limited extent, in stenosis and obliteration of the larynx which cannot be cured by other means, and in recurrent papillomata not removable by less heroic interference. These cases are, however, rare; for, since 1873, when Billroth first showed that this proceeding was feasible, only twenty cases have been reported. From these it is not possible to draw conclusive deductions; but it may be said that, whereas, in operations for total extirpation, the mortality is 33 per cent., after partial or unilateral extirpation, the mortality is not more than 20 per cent. Moreover, if the cases be properly selected, the dangers of recurrence are not greater after the partial, than after the complete, excision. Again, another advantage which is claimed for unilateral laryngectomy is, that the voice may be almost perfectly retained, without the use of a tracheal cannula, and deglutition also may be completely preserved.

I will now describe to you the steps of the operations, first, for total, and, second, for unilateral, laryngectomy. In the patient, J. W., tracheotomy was performed sixteen days previously to the operation of extirpation. In performing excision of the larynx, I made a median incision from the lower edge of the hyoid bone to the tracheotomy wound, which was situated on a level with the second ring of the trachea. The skin and subcutaneous tissues were then dissected from the thyroid cartilage in front, and the anterior margin of the thyro-hyoid muscle was exposed, and the substance of the muscle was separated from the upper part of the cartilage by the handle of the knife, while the origin of the muscle from the oblique line on the side of the thyroid cartilage was separated by incision as far back as the pharynx. This was done first on the left, then on the right side. The other muscles, namely, the sterno-thyroid and the inferior constrictors, were then dissected, the edge of the knife being kept close upon the cartilage. The cricoid cartilage was then dissected out, and the upper ring of the trachea exposed. When this had been done, the trachea was drawn forwards and upwards, and divided below the first ring. Up to this stage of the operation, chloroform had been administered through the tracheotomy tube; but, now that the trachea was divided transversely, it was necessary to introduce a large-sized tracheal tube (Macewen's), with an india-rubber ring round the end in the trachea, in order to prevent blood from flowing into the air-passages, and also to permit chloroform to be administered at a little distance from the operator. The mucous membrane on the posterior wall of the trachea was then carefully dissected from the œsophagus; the superior cornu, and upper part of the left ala of the thyroid, were then cut through and separated from the rest of the cartilage, so as to permit the posterior part of the larynx to be more readily dissected from the pharynx. The thyro-hyoid membrane was then divided in front, the epiglottis was divided at its base, and the upper attachments of the larynx were cut through. A small portion of the mucous membrane of the pharynx was taken away, along with the arytenoid cartilages. The portion of cartilage which was separated from the thyroid was then removed. All bleeding points having been secured, the trachea was stitched to the lower edge of the wound, and a large-sized tracheotomy-tube was fixed in position. The wound was dressed with absorbent cotton-wool sprinkled with iodoform, and inclosed in a casement of perforated green silk protective.

The patient was then placed in bed, and no food was administered until the evening, when a feeding tube was introduced into the œsophagus, through the upper part of the wound, and retained in position by a piece of sticking plaster.

In performing this operation, I divided the trachea and removed the larynx from below upwards. Some surgeons, however, prefer to do it in the opposite direction; this is a more tedious method, but it avoids the risk of blood entering the air-passages, on account of the severance of the larynx from the trachea being the last step in the

procedure. These advantages are, however, counterbalanced in the method which I adopted, by the circumstance that the operation can be performed more rapidly; while, by using a flexible gum-elastic tracheal tube, of sufficient size to fill the trachea, not only can the escape of blood into the lower air-passages be prevented, but the anæsthetic and the hands of the administrator are removed to some distance from the field of operation.

One point to which I desire to direct your attention is, the advantage of dividing the thyroid cartilage close to its upper posterior angle. By separating the superior cornu before dissecting the larynx from the œsophagus, the operation is greatly facilitated, and the danger of injuring the œsophageal wall, or large arteries, is removed. Some operators ligature the superior and inferior thyroid arteries, and if necessary the superior laryngeal, or even the hyoid branch of the lingual artery, as a preliminary to the operation of extirpation; but as far as my experience goes, the hæmorrhage is by no means great, and can easily be controlled.

Unilateral laryngectomy is performed by making an incision down the middle line from the level of the hyoid bone to that of the cricoid cartilage, while another is made along the lower margin of the hyoid bone. The soft parts are then separated from the cartilages on the diseased side; and, after the larynx has been exposed, the thyroid cartilage is split, and the interior of the cavity exposed to view. If, on inspection, the disease be found to be limited to one side, the affected parts are removed; but if not, the cricoid cartilage is not divided from above downwards, but is severed from the trachea transversely, the larynx is dissected from below upwards, and complete extirpation is performed.

Before concluding this lecture, it is necessary for me to say a few words with reference to the treatment of the patient preliminary to the performance of extralaryngeal operations.

The operation, whatever its extent, should be preceded by tracheotomy, which should be performed at least a week in advance. In most cases calling for extralaryngeal interference, the patient suffers from dyspnoea, and consequent engorgement of the pulmonary vessels. This is relieved by the free entrance of air through the tracheotomy-tube. Another reason why the trachea should be opened as a preliminary measure is, that the physical examination of the chest by auscultation is facilitated, especially in cases in which the entrance of air through the larynx is noisy. Moreover, the patient becomes habituated to the entrance of air through an artificial opening, and the irritation produced by the wound leads to adhesion of the trachea to the surrounding integuments. High tracheotomy should be performed; it does not practically interfere with the further steps of the operation, whereas low tracheotomy causes two wounds instead of one.

I will now say a word or two in respect to the after-treatment in cases of laryngectomy. The edges of the wound should not be brought together by sutures, but the cavity should be packed either with a sponge wrapped in perforated green silk, a method which I adopted in my first case; or, for the sponge, there may be substituted absorbent cotton-wool sprinkled over with iodoform or other antiseptic. The dressings should be replaced every twelve hours, and the surrounding atmosphere should be kept at a temperature of 70° Fahr., and warm sponges, sprinkled with iodoform, should be applied at short intervals over the opening of the tracheal tube. Care should be taken not to apply the iodoform too freely on warm sponges. The vapour of the antiseptic is rapidly absorbed by the lungs, and, in certain cases, symptoms of iodoform poisoning may suddenly develop.

The great object for the first few days, that is to say, until the surface of the wound has become covered by healthy granulations, is to keep the discharges thoroughly aseptic, and to prevent, by use of a large tracheal tube, the possibility of their entering the air-passages. Nourishment, and, if required, stimulants may be supplied through a tube introduced into the œsophagus, either by the mouth, or through the wound.

During the first few days after the operation, the only food required is milk, and this should be supplied at the rate of three or four pints in twenty-four hours. When the wound has become firm, the patient may be encouraged to take food by the mouth, and an artificial phonatory apparatus, such as the one I now show you (Dr. Irvine's modification of Gussenbauer's artificial larynx), may be introduced, and the edges of the wound drawn over the upper or pharyngeal limb by strips of sticking plaster. This instrument differs from the original tube devised by Gussenbauer in the following respects. The mechanism of the two limbs is reversed, so that the pharyngeal tube, in place of being introduced through the tracheal tube, is passed first, and the other limb is introduced through it. The phonatory reed is carried by the tracheal tube, and may be drawn out and in with great ease. These modifica-

tions were suggested by my friend Dr. Irvine, of Glasgow, and were employed in Dr. Foulis's first case. This apparatus (kindly made for me by Dr. J. Cowan Woodburn) I will use in a few days for the patient J. W.

I may now conclude by a remark or two with respect to the symptomatic treatment of cases of malignant disease which are unsuitable for operative interference, such as that of the poor man, D. McK., whom you have seen to-day. Life may be prolonged and rendered less intolerable—first, if the tumour cause dyspnoea, by the performance of tracheotomy, an operation which not only permits free access of air to the lungs, but, by relieving the œdema and inflammation of the upper air-passages, facilitates deglutition. Dysphagia may be relieved by the introduction of an œsophageal tube, or by spraying the pharynx with a solution of cocaine. Pain, on the other hand, may be alleviated by insufflations of starch containing a sixth to half a grain of morphine; or, what I consider even better, an ointment containing morphine may be applied to the larynx externally by inunction. Hæmorrhage may be restrained by the hypodermic injection of ergotine; while, to some extent, the general constitutional disturbance may be modified by the administration of preparations of arsenic. The prospects of alleviating suffering in these sad cases are small, and usually, within a few months, the glands becoming implicated, the patient dies. We, however, look forward to the time when very few cases of intrinsic cancer will be permitted to involve the lymphatic system without an attempt being made to remove the primary growth, either by partial or by complete laryngectomy. In order that this end may be achieved, it is absolutely necessary that the disease be recognised at an early stage.

ON THE EARLY TREATMENT OF PROSTATIC RETENTION OF URINE.

Read before the East Surrey District of the South Eastern Branch.

By GEORGE BUCKSTON BROWNE, M.R.C.S. Eng.

AN elderly man, requiring catheterism for partial or complete prostatic retention of urine, may be looked upon as a blind traveller unconsciously approaching the brink of a precipice, and his surgeon may be compared to the friend who, aware of the danger, hastens to his assistance. The friend must interfere, or else the man is lost; but, if he rush unskillfully to his aid, he may cause him to stumble, and so actually hasten his end, although by a very brief period of time; or the man may already have lost his equilibrium, the most skilful aid is unavailing, and he falls, and, in falling, may drag his would-be saviour down with him. In other words, the onlookers, ignorant of the danger, may attribute the loss of the patient to the surgeon and his catheter, and the surgeon's credit, dear to him as his life, be gone. Therefore, with regard to prostatic catheterism, it behoves us as practitioners of surgery, jealous of our reputation and of that of our art, to act from the very outset so cautiously and judiciously, that no one may have occasion to reproach us.

Putting metaphor aside, catheterism, in such cases as we are now considering, may be followed by fever, which varies in intensity from an almost imperceptible illness to one which may speedily place the patient's life in serious danger, and ultimately even prove fatal. In a few cases, there is no fever at all; in some there is a feeling of chilliness, followed by slight but general *malaise*; while in others there is, or is not, definite rigor, the temperature soon running up to 104° or 105°, with a pulse of 100 or thereabouts, followed by a feeling of great heat, and then by sweating and recovery. In graver cases, the fever may be continued and the rigors repeated, the patient ultimately recovering, but being left for a long time weak and prostrate; and, in the gravest cases of all, the fever continues, perhaps without further rigor, the temperature remains about 103° or 104°, the pulse perhaps 120 to 130, the tongue becomes dry, brown, and narrow, and the patient gradually sinks into a comatose condition, and dies.

Now, the important question arises, What is the etiology of this remarkable and often serious fever, and how is it to be prevented, or, at least, mitigated? The answering of these questions is the object of the paper which I have the honour of reading before you this afternoon. Owing to my association with Sir Henry Thompson, my opportunities of observation for the last twelve years have been very numerous. I have known the fever follow the passage down the urethra of a large and sharp edged renal calculus; and, in fact, it may