ON THE
OPERATION OF OPENING THE LARYNX
BY
SECTION OF THE CARTILAGES, ETC.,
FOR THE
REMOVAL OF MORBID GROWTHS.

BY
ARTHUR E. DURHAM, F.R.C.S.,
SURGEON TO, AND LECTURER ON ANATOMY AT, GUY'S HOSPITAL.

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THE operation of opening the larynx by section of the cartilages, as well as of the soft parts, in order to facilitate the removal of morbid growths and foreign bodies is by no means a new one. It was suggested, clearly described, and strongly recommended by Desault some hundred years ago; and indeed it is still sometimes spoken of as "Desault's operation." It does not appear, however, to have been ever actually practised by that distinguished surgeon. But of late years—and especially since the use of the laryngoscope has rendered the diagnosis of laryngeal affections comparatively easy and certain—it has been repeatedly performed in this country,

and somewhat more frequently abroad. Nevertheless, so far as I am able to judge, the merits of this method of proceeding are, as yet, neither so generally recognised, nor so highly appreciated as it seems to me they deserve to be; while on the other hand the difficulties and dangers involved are very commonly and very greatly over-estimated.

I therefore venture to submit to the consideration of the Fellows of the Royal Medical and Chirurgical Society on the present occasion the following details of five cases in which this operation has been performed for the removal of morbid growths either by myself, or by one of my colleagues, at Guy's Hospital. And I would at once express my thanks to Mr. Bryant and Mr. Davies-Colley for their kind permission to include the particulars of their cases with mine in this communication. I also venture to submit a few general remarks and conclusions suggested by these cases, considered in conjunction with the various other cases that I have been able to find on record, in which, with like purpose, similar operations have been performed.

CASE I.—The details of my first case have already been published *in extenso* in the volume of the 'Guy's Hospital Reports' for the year 1866. I therefore simply recapitulate the more important particulars.

Mary F— was first admitted into Guy's Hospital in August, 1862, when she was about nine years of age. She was suffering from such urgent dyspnoea that tracheotomy was performed by the then house surgeon, Mr. Holmsted, within a few hours of her admission.

The history given was to the effect that the patient had been for a long time subject to attacks of "sore throat" and "loss of voice;" and that the last attack, which had come on some weeks previously to her admission, had never subsided, but the symptoms had gradually increased in severity until she was scarcely able to breathe or to swallow. At the end of about seven weeks she left the hospital comparatively well in health, but wearing the tracheotomy canula, and quite unable to utter a sound or to breathe through her larynx.

In the course of the next four years she was readmitted to the hospital under my care no fewer than eleven times, and on each occasion she remained in some two or three weeks, or more. The most persevering attempts were made from time to time to obtain a view of the interior of the larynx. But the extreme sensitiveness of the parts, and the obstinate resistance of the patient defeated all such attempts until during her last stay in the Hospital. In July, 1866, I succeeded in seeing quite distinctly a considerable warty growth on the left false vocal cord, and in making out, though somewhat less positively, that the whole of the larynx was blocked up by similar growths.

On 27th of July, chloroform having been administered through the tracheotomy canula, I passed a small curved sharp-pointed knife straight through the superficial structures, the crico-thyroid membrane and the mucous membrane of the larynx, and cut directly upwards in the middle line through the thyroid cartilage, &c., thus dividing all the structures by one incision as high as the thyro-hyoid membrane, which was only slightly cut. The cricoid cartilage was subsequently divided in order to give more room. Some hæmorrhage and somewhat severe spasmodic cough followed the first incision. When these had subsided (which they did very speedily), and the lips of the wound were drawn apart, it was at once seen that the whole cavity of the larynx was stuffed with warty growths varying in size and precise situation. The largest was that already mentioned as seen by aid of the laryngoscope on the left false vocal cord. There were none, or only two or three minute ones, *below* the true vocal cords; but with this exception, the mucous membrane of almost every part of the interior of the larynx was covered with them. All were carefully removed; some were cut off with scissors, others were twisted off with forceps. The slight bleeding which ensued was easily arrested by free exposure to the air, and temporary pressure by means of sponges. The wound was closed by sutures and strapping. The tracheotomy canula which had not been in any way interfered with during the operation was left *in situ*.

The next day the patient could breathe through the larynx, and could produce audible sounds.

On the seventh day after the operation the recent wound had entirely healed. On the 10th day the tracheotomy canula was removed, after having been continuously worn for just four years. The opening very speedily closed up; and on 22nd August, not quite a month after the operation, the patient left the Hospital in excellent health, breathing easily and well, and able to speak quite audibly.

I last saw her about a year ago, more than four years after the operation. She had grown into a fine thoroughly healthy young woman, breathing and speaking as though she had never had anything the matter with her larynx. Her mother said of her "You might hear her singing from the top of the house to the bottom."

Laryngoscopic examination showed no indications of any return of the growth.

CASE II.—James G—, aged 7 years, was admitted into Guy's Hospital under my care on the 27th July, 1870. From the time when he was about two years old he had suffered more or less constantly from difficulty of breathing and loss of voice. These symptoms increasing in severity he was placed under the treatment of my friend Dr. Carey (of Guernsey), who after a time found it necessary to perform tracheotomy in order to rescue the patient from impending suffocation. The operation was performed when the child was between three and four years old, and was entirely successful in relieving him from his previous state of suffering and danger. His voice, however, was entirely lost. Many ineffectual efforts were made from time to time to obtain a view of the interior of the larynx by aid of the laryngoscope; and various methods of treatment were tried, but without any good result. He continued to wear the tracheal canula during the next three or four years, being quite unable to breathe through the natural passage. At the end of that time he was brought to me by Dr. Carey, and admitted as before-said into Guy's Hospital under my care. The history of the

case and the symptoms presented, viz. absolute inability to breathe through the larynx, and total loss of voice without obvious swelling or pain, or other indications of local inflammatory mischief, at once suggested the probable existence of warty growths in the larynx. This diagnosis after a number of futile attempts was at length confirmed by laryngoscopic and digital examination.

On the 30th August, chloroform having been administered, I made an incision along the middle line through the skin and superficial structures on to the laryngeal cartilages and upper rings of the trachea, and then gradually cut through the cartilages and mucous membrane from above downwards as low as the existing opening in the trachea. A mass of warty growths at once became projected between the borders of the incision, and on separating the divided edges the whole cavity of the larynx was seen to be filled by similar growths. The mucous membrane covering the vocal cords, true and false, as well as that lining the ventricles, and the part of the larynx below the true vocal cords, was everywhere studded with these growths, some forming more or less considerable masses, and others almost isolated and very small. All were carefully and completely removed by means of scissors, or dressing forceps, or wiped off by the sponges which were freely used. Nitrate of silver was then applied to the surface generally, and especially to all bleeding points. The slight hæmorrhage that occurred was speedily and easily arrested; and the spasmodic cough, which had been at first excited, soon subsided. The tracheal canula was readjusted and fixed in position, and the part of the wound above it was closed by sutures and sticking-plaister. The patient passed a good night. The next day he was free from pain in the parts operated upon, but complained of some soreness about the chest. He was able to breathe through the larynx when the orifice of the tracheal canula was closed.

In the course of the following few days a slight attack of bronchitis supervened; but this speedily yielded to treatment, and no serious symptom presented itself.

On the eighth day after the operation the sutures were

removed, and the wound was found to be entirely healed almost as far down as the situation of the tracheal canula. The patient could breathe quite freely through the larynx, and could speak in an audible whisper. The tracheal canula was ordered to be kept constantly closed during the daytime by means of a gutta-percha plug, which could be at once taken out in case of need.

Three weeks after the operation the tracheal canula was finally removed, and the borders of the opening, in which it had been so long worn, were brought together by means of sticking-plaister.

The patient steadily improved in health and strength, and gradually regained his voice. It became a standing amusement with the other patients in the ward to teach him to sing. This he did in a very amusing way, but in a key preternaturally low for a boy of his age.

The opening into the trachea contracted to a certain extent and then remained for a long time unchanged in appearance, showing no disposition to close up altogether, but assuming the aspect of a permanent fistula. It was kept constantly covered by layers of plaister so that no air could pass through, and nitrate of silver was frequently applied. Such means proving useless, three months after the operation I pared the edges of the opening and fixed the fresh surfaces in contact by means of sutures. It was necessary, however, to repeat this proceeding before the opening could be made to close finally and entirely.

The patient left the Hospital quite well on the 22nd February of the present year (1871).

I last heard of him some nine months after the operation. His parents reported that he was somewhat "delicate in general health," but that "he breathed perfectly well," and that "they were quite satisfied with the condition of his voice."

CASE III.—Ellen A—, 8 years of age, was admitted into Guy's Hospital under my care on the 10th August, 1870. Before she was two years old she became hoarse soon after a

very severe attack of whooping-cough. The hoarseness remained persistent and gradually increased in severity. After a time she lost her voice, and began to suffer from difficulty of breathing.

In the year 1866, when about four years old, she was admitted into Guy's Hospital under my care; and I performed tracheotomy upon her on account of the urgent dyspnoea from which she was suffering, it being at that time impossible to ascertain precisely the cause of her symptoms. She was at once relieved, and after a time left the Hospital breathing freely through the canula, but quite unable to breathe through the larynx, or to utter an audible sound. I saw and examined her from time to time, and after several attempts distinctly recognised the presence of warty growths partially filling the larynx and apparently springing from the false vocal cords; further I could not see. The parents, however, refused to have any further operation performed, and they persisted in their refusal until the period of her second admission to the Hospital. At that time it seemed to me on laryngoscopic examination that the growths were fewer and relatively smaller than when I had previously seen them. Moreover she could breathe to some extent through the larynx when the orifice of the tracheal canula was closed, but she remained absolutely voiceless.

On the 18th October, chloroform having been administered, I proceeded to operate in the same manner as in the case just described. There were some eight or ten small warty growths scattered over the true and false vocal cords, and also two or three minute ones in each ventricle. These were removed as in the former cases, and nitrate of silver was freely applied. The wound was then closed by sutures as far down as the opening for the tracheal canula, which was readjusted and fixed in position. There was but little bleeding and the spasmodic cough excited soon subsided.

The patient progressed very favorably, though for the first two or three days she suffered from frequent and trying cough.

On the fifth day the stitches were removed, the wound being

healed almost as far down as the tracheal opening. The patient could breathe freely through the larynx.

In less than three weeks after the operation she could speak audibly, and the tracheal canula was removed and plaister applied over the opening. In this case, however, as in the preceding one, it was necessary to pare the edges and apply sutures before the fistulous opening leading into the trachea could be made to close. This result, however, was finally accomplished, and the patient left the hospital between five and six months after the operation in excellent health, breathing perfectly well, and speaking in a clear and distinct though rather feeble voice. I have not seen her since, but her parents would have been certain to have brought her to me if there had been the slightest recurrence of unfavorable symptoms. When I last examined her by aid of the laryngoscope no abnormal appearances were presented.

CASE IV.—Alfred T—, aged 3 years, was admitted into Guy's Hospital under the care of Mr. Bryant, on the 24th September, 1870. Sixteen months previously the patient became hoarse, and in the course of two months entirely lost his voice. He soon began to suffer from difficulty of breathing, which gradually increased in severity until the period of his admission. On external examination some slight swelling about the larynx could be perceived.

On the 11th October, chloroform having been administered, Mr. Bryant made an incision through the soft parts along the median line of the neck, opened the trachea, and inserted a canula. He next by means of a curved bistoury cut upwards from the opening in the trachea, and divided in succession from within outwards the cricoid cartilage, the cricothyroid membrane, and the thyroid cartilage together with the mucous membrane of the larynx. The thyro-hyoid membrane was afterwards partially divided. There was some brisk hæmorrhage which, however, was speedily arrested by the torsion of two or three vessels and the application of pressure. When the divided parts were held asunder numerous warty growths, varying in size and situation, were seen scattered over

the surface of the mucous membrane of the larynx. These were removed by scissors or forceps, or detached by the finger nail and sponged away. The whole surface of the mucous membrane was then freely mopped over with a solution of perchloride of iron. The tracheal canula was tied in, and the wound closed above it by sutures. Two or three attacks of severe difficulty of breathing, with lividity of countenance, occurred in the course of the operation; but these were soon recovered from, and at the close the patient was in fairly comfortable condition.

The after progress was most satisfactory. By the end of a week the child could make himself understood very well, speaking in a kind of whisper. For a few days there was some considerable muco-purulent discharge through the canula.

In the course of a fortnight the canula was removed, and by the end of three weeks the wound was entirely healed. Breathing was perfectly easy, and the voice was improving. He left the Hospital well on the 3rd November of last year.

Mr. Bryant informs me that he heard an excellent account of the patient about a fortnight ago; that is, rather more than a year since the operation. He was "in perfect health, eating, drinking, breathing and speaking just like any other child."

CASE V.—Alfred M—, 4 years of age, was admitted into Guy's Hospital under the care of Dr. Pye-Smith on the 26th June, 1871. He subsequently came under the care of Mr. Davies-Colley.

The patient was said to have caught cold eighteen months before admission. His voice became husky, and his breathing less free than natural. The symptoms gradually increased in severity, and during the last three months he had entirely lost his voice.

On admission the child was found to be suffering severely from dyspnoea. His face was anxious, his lips were blue, and his eyes prominent. His respiration was quick and harsh;

his arms were held back, and all the intercostal spaces were drawn in during inspiration.

On the 2nd day after admission, suffocation seeming imminent, Mr. Colley performed tracheotomy. Relief from all the urgent symptoms was at once obtained. The child speedily recovered from the immediate effects of the operation, as well as from his previous state of suffering. It was found, however, that he could not breathe at all through the larynx, or only to a very slight extent. The attempt to make him do so was followed by severe dyspnœa. Digital examination confirmed the opinion expressed that the obstruction was due to the presence of some morbid growth in the larynx.

On the 3rd August, chloroform having been administered, Mr. Colley exposed the larynx along the middle line, and then (all bleeding having been arrested) cut through in succession the thyroid cartilage and crico-thyroid membrane. It was subsequently found necessary to divide the cricoid cartilage and also the upper rings of the trachea. A large number of warty growths were then removed by means of scissors and forceps. These growths varied in size and position; they were irregularly scattered over the whole internal surface of the larynx; some were above the false vocal cords; some on the base of the epiglottis, others on the vocal cords and in the ventricles, and others, again, as low down even as the opening made for the tracheal canula. The true vocal cords could scarcely be distinctly recognised; and in no part did the mucous membrane present a natural appearance. Nitrate of silver was freely applied. The tracheal canula was then fixed in position, and the wound above it closed by sutures.

For some time the case progressed very favorably, the wound healed down to the tracheal canula, and the child could breathe freely when the orifice of the canula was closed. He was also able to speak plainly enough in a somewhat husky loud whispering voice. A month after the operation the tube was removed. The child did very well during the day time; but at night it was found necessary to replace the tube. A similar experiment was tried a month later, and with like result.

On laryngoscopic examination a roundish swelling of or from the mucous membrane covering the right arytenoid cartilage could be distinctly seen. The general cavity of the larynx could not be brought into view. It was believed that the swelling alluded to was inflammatory in origin, and that under treatment it might perhaps subside.

Latterly the voice has become less distinct than it was, and the child is again unable to breathe freely when the orifice of the trachea canula is closed. It would appear not improbable that a recurrence of the growth is taking place.

This case must be regarded as incomplete and still under treatment. But I have thought it well to detail the history so far, inasmuch as it serves, at any rate, to show, in conjunction with the preceding cases, that the operation itself and its immediate results may be regarded as comparatively free from danger.

ADDENDUM, June, 1872.—The further progress of this case has been as follows. The child continued well in health, but his voice became less and less distinct, and after a time he was altogether unable to breathe when the orifice of the tracheal canula was closed. On examination (laryngoscopic and digital) it became manifest that a fresh crop of warty growths had sprung up. Under these circumstances a repetition of the operation was decided upon. Accordingly on the 3rd March of the present year (1872), chloroform having been administered through the canula, and the canula having been removed, Mr. Colley passed a curved director through the tracheal opening, and upwards through the glottis. He then by means of a curved bistoury laid open the larynx along the middle line by a single incision which was carried as far upwards as the hyoid bone. On separating the divided parts a great number of warty growths, studding the surface of the mucous membrane, were brought into view. They were removed and nitrate of silver freely applied as in the previous operation. The tracheal canula was replaced, and the portion of the wound above it closed by sutures &c. All went on

well ; a fortnight or so after the operation the child was running about the ward and able to breathe freely through the larynx. On the 20th March Mr. Colley removed the canula. No inconvenience resulted. The wound rapidly closed, and on the 4th April the patient was discharged in excellent health breathing freely through the larynx, and able to speak audibly, though by no means in a natural voice.

Appended to the present communication are condensed but more or less complete reports of all the cases I have been able to find on record in which the laryngeal cartilages have been divided in order to facilitate the removal of morbid growths. These cases are thirty-two in number, and with the five related above give a total of thirty-seven.¹ In at least nineteen of these the result of the operation may fairly I think be regarded as having been *completely successful*, natural respiration and voice having been restored in each, although in some few the voice is stated to have remained harsh or low in tone. In seven the result may be considered to have been *partially successful*, natural respiration having been restored, but the voice having remained extinct or at best reduced to a hoarse whisper.

In four cases some degree of *temporary benefit* resulted ; but in all of these the growth was of cancerous nature, and either was not completely removed or soon recurred.

¹ Since this paper was read Mr. Henry Lee has kindly favoured me with the particulars of a case in which he operated upon a patient admitted into St. George's Hospital, under the care of Dr. J. W. Ogle, who has been so good as to supply the early history. The result was very satisfactory, natural respiration having been restored, and the voice regained, although at the last observation it was still "croaking." M. Demons, of Bordeaux, has informed me that a similar case has come under his notice, the particulars of which, however, are not yet published. And, lastly, my attention has been called to another case, published in the 'Liverpool Hospital Reports,' 1867, which I had accidentally overlooked, in which Mr. Long obtained a good result—natural respiration and fair voice having been restored. To the details of these cases I shall venture to direct attention on a subsequent occasion. For the present they may be regarded as confirmatory of the opinions expressed in this communication, and added to the number of successful cases.

In at least three cases the result can only be considered as negative, no harm seeming to have been done by the operation, nor any good to have been effected by the attempt made.

Two cases are incomplete, but in each of these the final result will probably prove to be good.

Lastly, in two cases—and in two only—death appears to have resulted more or less directly from the operation. In each of these, however, “pyæmic” poisoning led to the fatal issue. The first (No. 31 in the Appendix to the present paper) is that in which Debrou, of Orleans, successfully removed a fibrous growth after division of the thyro-hyoid membrane and thyroid cartilage. In order to avoid risk of suffocation from inflammatory swelling of the mucous membrane of the larynx he also performed tracheotomy. The patient died seven days after the operation. Post-mortem examination revealed the presence of abscesses in the bases of both lungs. The other case is that of Schrötter, of Vienna (No. 32 in the Appendix), in which a futile attempt was made to remove a very extensive cancerous growth from the larynx of a man 63 years of age. After the densely ossified cartilages had been cut through, and the extent and connections of the growth were made manifest, the operation was abandoned. The next day erysipelatous inflammation appeared around the wound, and rapidly spread down the right arm. Gangrene and sloughing of the parts about the larynx ensued, and on the eleventh day the patient died. Post-mortem examination revealed almost universal broncho-pneumonia, and purulent infiltration of the areolar tissue of the right arm, &c.

That death should thus have occurred in two cases in the manner described cannot for one moment be considered to indicate any special danger in the operation under discussion. But, on the contrary, that death should *not* have occurred in direct connection with the operation in any other way may fairly, I think, be regarded as affording strong evidence, if not absolute proof, that the operation itself is comparatively free from danger, provided always that due care and skill on the part of the surgeon be exercised.

The conclusion thus expressed is at variance with that stated by Dr. Morell Mackenzie in his recently published and elaborate treatise on "Growths in the Larynx."¹

Considering the prospect of the operation in relation to the preservation of life, Dr. Mackenzie says "in division of the laryngeal cartilages there is always some immediate danger, and nine out of the twenty-eight cases on record terminated fatally."¹ This mode of expression clearly implies that in the cases recorded to have terminated fatally, in the opinion of Dr. Mackenzie, death was due in some way or other to the operation. But it appears to me that such a conclusion is scarcely in accordance with the facts, as may be shown by a critical examination of the cases of fatal result enumerated in Dr. Mackenzie's "Thyrotomy Table."

The first of these cases (No. 1 of Dr. Mackenzie's Table, No. 18 in my Appendix) is that in which Brauers of Louvain cut through the thyroid cartilage of a man aged 40, and then repeatedly cauterized with various preparations and finally with the hot iron the growth which was found to exist in the larynx. Severe suffering was produced, and no doubt life was endangered. But it is distinctly stated in the record given by Ehrmann to which Dr. Mackenzie refers that *death had not yet occurred when the report was furnished*. Further, Krishaber appears to have ascertained that the patient lived twenty years after the operation, and then died of some disease altogether foreign to the larynx.²

The next case (No. 2 in Mackenzie's Table, No. 17 in Appendix of cases to present paper) is that in which Ehrmann removed a papillomatous mass from the larynx of a woman 33 years of age after division of both thyroid and cricoid cartilages. The wound healed favorably. Natural respiration was restored, but the voice was not regained. Seven months after the operation the patient died of typhoid

¹ 'Growths in the Larynx,' p. 94. By Morell Mackenzie, M.D. Lond. 1871.

² See Appendix of Cases, No. 18. Krishaber's precise statement in reference to this case is as follows: "Mais nous apprenons en 1866 seulement que le malade de M. Brauers à survécu à l'opération plus de vingt ans, et qu'il mourut d'une maladie étrangère au larynx."—'Dict. Encyclop. des Sciences Médicales,' Art. "Larynx," p. 762.

fever. The ordinary intestinal lesions were found on *post-mortem* examination, and it was also shown that the larynx was in comparatively healthy condition. There were, however, some indications either of a return of the growth, or that some remnants had been left at the time of the operation. It is not quite clear whether Mackenzie reckons this as a fatal case of thyrotomy or not. In his table he gives us the *result* of the operation "Persistent Aphonia, Death from typhus seven months later;" but in a foot-note on a subsequent page (97) he refers to this case as one "which is justly considered as a case of recovery with aphonia."

The third case (No. 3 in Mackenzie's Table, No. 23 in the Appendix to the present paper) was a case of cancer. The patient survived the first operation fifteen months, and is distinctly reported to have been benefited by what was done.

The fourth case is that operated upon by Rauchfuss, of St. Petersburg (No. 4 in Mackenzie's Table, No. 26 in the Appendix to this paper). The growth could not be entirely removed. Little or no benefit resulted from the operation, but it was not until *two years* afterwards that the patient died; and then the cause of death, ascertained on post-mortem examination, was gangrene of the lungs, apparently set up by the presence of a foreign body (a chicken bone), which had passed through a fistulous communication between the oesophagus and trachea, and was found in the right bronchus. The fistulous opening in question was clearly shown to have no connection with the operation, nor to have resulted from the pressure of the tracheal canula which had been persistently worn.

The fifth case is that in which Sands, of New York, removed a growth from the larynx of a woman 30 years of age (No. 6 in Mackenzie's Table, No. 1 in the Appendix of the present paper). Respiration was perfectly restored; and a good voice, though not normal in tone, was regained. Death occurred twenty-two months after the operation, and was proved, on post-mortem examination, to have been due to cancer of the left kidney and both supra-renal capsules.

The larynx showed no indications whatever of any recurrence of the malady.

The sixth case is that in which Boeckel, of Strasburg, removed a large papillomatous growth from the larynx of a woman, 24 years of age (No. 7 in Mackenzie's Table, No. 19 in the Appendix to this paper). The wound healed entirely, and the patient left the hospital in good health and returned to her home, breathing perfectly freely, but aphonic. She died from some cause not definitely explained some five or six weeks later, that is, three months after the operation—not two months only, as stated in Dr. Mackenzie's Table. The medical man, who was not called in until the patient was actually *in extremis*, could give no information as to the nature of her fatal illness. Boeckel suggests that she probably died of some intercurrent affection of the lungs which she contracted in the rude climate of her valley. At any rate it seems clear that there was nothing to connect her death with the malady from which she had previously suffered, and still less with the operation by which she had been indisputably relieved from that malady. There is every probability that if there had been any recurrence of her laryngeal symptoms they would have been at once recognised and duly reported.

The seventh case, that of Debrou (No. 9 in Mackenzie's Table, No. 31 in the Appendix to this paper) has been already alluded to as a case in which the fatal issue may legitimately be ascribed to the operation. The patient died of pyæmia seven days after the operation. On post-mortem examination metastatic abscesses were found in both lungs; but the part operated upon, and the larynx generally appeared to be healthy.

The eighth case (No. 10 in Mackenzie's Table, No. 24 in the Appendix) was a case of cancer. Death did not occur until a year after the operation, and Sir Duncan Gibb, who (with Mr. Holthouse) had charge of the case, distinctly intimates that temporary benefit resulted.

The ninth case (No. 25 in Mackenzie's Table, No. 32 in the Appendix) I cannot at present satisfactorily explain.

The reference given ('Medizin. Jahrbücher,' Wien, 1869, vol. xvii, 2nd Heft, p. 81), the date, and the name of the operator, &c., apply to the case of Schrötter, already mentioned (No. 32 in the Appendix), in which the operation was abandoned and the patient died some days subsequently. But Dr. Mackenzie states as the result "Death from hæmorrhage in seven hours." Now it will be recollected that Schrötter's patient survived the operation until the eleventh day (*not seven hours only*), and then died from bronchopneumonia, and exhaustion resulting from erysipelas and gangrene, and *not from hæmorrhage*.

Further, although I have made diligent search, I have hitherto failed to find any case on record in which death occurred from hæmorrhage in seven hours (or, indeed, after any longer period) as the result of this operation. If I had been able to do so, the details would have been furnished with those of the other cases appended to this paper, and the case would have been duly taken into account in the conclusions expressed. Dr. Mackenzie, however, would appear to have obtained evidence of the occurrence of such a case, inasmuch as, in his general remarks he emphatically makes the statement, "In one case the patient died from hæmorrhage seven hours after the operation." It is obvious, therefore, that in some way or other a serious mistake has been made, or else that an important oversight has occurred. Under any circumstances, however, Schrötter's case, as already stated, must be regarded as one in which the operation directly conduced to the fatal result, though not in the manner stated by Mackenzie.

The last case in connection with which a fatal result is recorded in Mackenzie's table (viz. No. 26 in Mackenzie's table; No. 25 in the Appendix) was one of malignant epithelioma, in which the growths do not appear to have been entirely removed. Recurrence or increase speedily took place, and death occurred about seven months after the operation. In this case the patient, who was under the care of Dr. Mackenzie and Mr. Wordsworth, experienced considerable temporary relief as the result of the operation.

It would thus appear that, out of the nine cases which Dr. Mackenzie speaks of as having terminated fatally, only two can be properly regarded as cases in which death resulted in any way from the operation; and in each of these the fatal result was brought about in a manner by no means special to this operation, but, alas! of far too common occurrence in general surgical experience.

That patients suffering from cancerous disease of the larynx should die at periods varying from six months to two years after it had become absolutely necessary to do something for their relief argues nothing as to the danger of the operation performed. But that temporary relief should be obtained, as is stated to have been the case in each of the above-mentioned instances, may fairly be considered to afford evidence in favour of the means adopted.

Having thus attempted to show that the danger to life attending this operation is comparatively small—at any rate, very considerably less than has been represented—I pass on to make a few remarks upon some of the difficulties likely to be encountered.

Judging from my own experience and observation, and from a careful study of the recorded experience of others, I have no hesitation in expressing the opinion that such difficulties are fewer, and more easily overcome than appears to be generally supposed.

First, with regard to hæmorrhage:—If the incision is kept strictly to the middle line, it is impossible that any large vessel can be wounded. Moreover, the parts are necessarily divided to such an extent that any wounded vessel is fully exposed and easily secured. The effects of entrance of blood into the trachea *look* much more formidable than they really are. If only the divided parts are widely opened out, and so maintained that air may enter freely, any blood that may be drawn in (or, at any rate, the greater part of it) is sure to be very quickly coughed out again. There is a great difference between the conditions in this operation and those in a simple tracheotomy. In the latter case the opening made into the air-passage is comparatively small, deep-seated, and,

it may be, half-hidden. Blood may possibly, therefore, enter from some unseen source more quickly than air, and more quickly, too, than it can be expelled. But when the cartilages of the larynx are divided, there ought to be easily maintained both free entrance for air and free exit for blood.

Bleeding from the internal surface of the larynx is easily enough controlled and arrested by pressure or the application of styptics when the bleeding surface is so completely exposed to view as it may, and ought to be in this operation. The difficulties that are stated to have been met with appear to have arisen in great measure from insufficient exposure of the parts.

The introduction of a tracheotomy canula (in case tracheotomy has not previously been performed) into the lower part of the wound, and the insertion of a small piece of sponge into the trachea above the canula, may afford material aid in securing free respiration and hindering the flow of blood down the air-passages.

The spasmodic up-and-down movements of the larynx, and the violent paroxysms of cough that occur when the larynx is opened, may often give rise to trouble and delay in the operation. But after a little time, the parts being allowed to remain at rest, these symptoms subside; and, although for a period they may seem alarming, no danger need be apprehended if only a full supply of air is ensured.

Next, with regard to the division of the cartilages:—Experience shows that the operation may be easily and successfully accomplished, even though the cartilages are densely ossified. In such case, however, cutting forceps or strong scissors answer better than the knife.

There is no great difficulty in avoiding the vocal cords while cutting through the thyroid cartilage. In only one case among those recorded in the Appendix is it stated that one of the vocal cords was accidentally injured (see No. 11). In this case no material harm resulted, though the voice was probably less perfectly restored than might otherwise have been the case. If the opening is commenced below, and a grooved director passed up between the vocal cords, their

safety may be absolutely insured; but such a proceeding I believe to be unnecessary, it seeming to me to be the best plan to divide the cartilages by cutting through them from without inwards, and from above downwards, and to separate slightly the alæ of the thyroid cartilage before actually penetrating the mucous membrane.

In the removal of the growth no great difficulty is likely to occur unless some important part of the larynx is structurally involved in the growth. In such case the part involved may be removed to a greater or less extent with the tumour,—as was done in a case recorded by Kœberlé, in which he removed the right vocal cord with the growth, and exposed the internal surface of the thyroid cartilage (see Case 20 in Appendix); or, some portions of the growth may be cut away and the remainder deeply cauterised; or it may prove necessary to abandon the operation altogether. But whatever difficulty may arise in the removal of the tumour, whether from its nature or connections, it is obvious that such difficulty can be overcome much more readily and much more certainly when the larynx is freely opened, as in this operation, than could possibly be accomplished by any method of proceeding carried on through the natural passages.

In a considerable number of the cases in which this operation has been attended by success, many abortive attempts had previously been made to remove the growths through the mouth—attempts that were defeated in part by the difficulty experienced in detaching the growths.

With regard to the best method of performing the operation, and the precautions to be observed, little need be said beyond what has been already advanced or may be gathered from the records of cases in the Appendix. The various methods adopted by different surgeons are duly described with the general details of the several cases. The extent to which the laryngeal walls should be incised must of necessity be determined by the precise situation and extent of the growths which are to be removed. As a general rule it is probably best to begin by dividing the thyroid cartilage and crico-thyroid membrane, and subse-

quently to continue the section upwards through the thyro-hyoid membrane, and downwards through the cricoid cartilage and upper rings of the trachea to such an extent as may be necessary in order to expose fully and completely the bulk and points of attachment of the growth or growths. Experience has shown, as may be seen on reference to the Appendix, that cases in which both thyroid and cricoid cartilages, thyro-hyoid and crico-thyroid membranes, and the upper rings of the trachea have been divided, have been followed by results as successful as those obtained after section of the thyroid cartilage alone.

The questions,—1st as to whether tracheotomy should be performed as a preliminary; and, 2ndly, as to whether it is desirable to leave the canula in the trachea after the major operation has been completed,—must be determined by the circumstances and conditions of the particular case to be dealt with. In many instances it has happened that there has been no option, and tracheotomy has been performed under urgent necessity, and at times when the major operation would have been impracticable, or even perhaps before it has been possible to arrive at a satisfactory diagnosis.

There can be no doubt that in the majority of instances it is advantageous that a canula should be in the trachea, while the growths are being removed, and until all bleeding has ceased. But so far as the result is concerned it would appear to matter very little whether the trachea has been opened at some anterior period, or whether this has been done as a first act in the major operation. In each of my own three cases tracheotomy had been performed some years previously—in Mr. Colley's case a short time previously—while in Mr. Bryant's the tracheotomy and the opening of the larynx formed parts of one and the same operation. In all cases in which the growths have been numerous, or their attachments have been extensive, and in which, therefore, the mucous membrane of the larynx has been exposed to much damage and rendered especially liable to become inflamed, I think it is desirable to leave the canula in the

trachea, at any rate for some days, as a safeguard. It is true Debron considered the presence of the canula to have indirectly conduced to the death of his patient. But this can be regarded only as a very exceptional occurrence. In case the growths should be few or single, and the mucous membrane but slightly interfered with, it may perhaps be considered safe to dispense with the use of the canula and to close up the whole wound at once. This was done in Krishaber's case. (See Appendix No. 13.) No canula was introduced,—indeed, the thyroid cartilage only was divided, and the wound was closed by sutures. It was found necessary, however, to remove the sutures and the wound opened. A perfect result, however, speedily ensued. In one of Balassa's cases (No. 7 in the Appendix) the operation was performed twice on the same subject. The first time tracheotomy was performed as a preliminary, and the canula was allowed to remain for a certain period after the completion of the major operation. All went well; but recurrence of the growths took place. At the second operation the thyroid cartilage and the crico-thyroid membrane only were divided. The trachea was not opened. No canula was introduced; but the whole extent of the wound was at once and entirely closed by sutures. The result was perfectly successful.

A just estimate of the general and special merits of the operation of opening the larynx by section of the cartilages in order to facilitate the removal of morbid growths can only be obtained by personal experience, or by the careful study of the full details of the recorded experience of others; and I cannot but think that the examination of the records of cases appended to this paper will lead those who have hitherto had no personal experience of the operation to the general conclusions at which I have arrived, viz., 1st that the dangers and difficulties attending it are neither so numerous nor so considerable as have been represented and commonly supposed; and, 2ndly, that the success hitherto achieved has been so marked and so indisputable as to justify and encourage in any such

case as may seem appropriate an earlier, bolder, and more ready resort to this method than has hitherto prevailed.

It is quite unnecessary to enter upon any discussion as to the relative merits of the method of removing growths from the larynx after the section of the cartilages, and the various methods that have been devised and practised for removing such growths through the natural passages by aid of the laryngoscope.

The results obtained in very many cases by these latter methods may be reckoned among the most brilliant triumphs of modern surgery. And no one, I think, would nowadays consider it justifiable to cut open the larynx to facilitate the removal of any growth or growths that could be easily, safely and completely removed through the natural passages. But unfortunately it happens that cases occur from time to time in which the growths are numerous or very large, or single but firmly attached; or in which the patients are young, and ill able to bear the introduction of the necessary instruments through their narrow natural passages; or again, in which excessive sensibility of the parts, and irritability of the patient render futile all attempts through the mouth. In such cases there can be no doubt, I think, that resort to the method I have been discussing affords the best chance of success; and, indeed, reference to the Appendix will show that in many cases it was not adopted until other methods had been tried and found useless.

Further, it may be urged that in all cases in which the nature of the growth is suspicious greater security against recurrence may be obtained by the more complete removal that may be assured after the larynx has been opened and its interior fully exposed to view. This very obvious fact is not in accordance however with what would appear to be the opinion of Dr. Mackenzie, who seems to intimate that recurrence is more likely to take place after the larynx has been opened than if removal through the mouth has been effected.¹ But it must be borne in mind that Dr. Mackenzie's conclusions

¹ See Report of Dr. Mackenzie's paper, read before the British Medical Association, 'British Medical Journal,' 1871, vol. ii, p. 245.

as to the comparative liability to recurrence of a growth after the different operations are derived from a numerical comparison of two sets of cases; and that cases of cancerous disease are freely included in one set but rigidly excluded from the other.¹ It is needless to say which set of cases presents the largest proportion of instances of recurrence.

In conclusion I would only add that I propose to take an early opportunity of asking permission to lay before the Fellows of the Royal Medical and Chirurgical Society the results of my experience, and reading relative to the operation of opening the larynx by section of the cartilages in order to facilitate the removal of foreign bodies.

APPENDIX.

CASE 1.—*Malignant Growth; Tracheotomy; Cricoid and Thyroid Cartilages, &c., divided; Growth entirely removed. Result successful; Respiration perfect; Voice restored, though not to its normal tone. Death twenty-two months later from Cancer of the Kidneys, &c.*

(‘New York Medical Journal,’ May, 1865. Dr. H. B. Sands, New York.)

Maria M—, æt. 30, came under observation in January, 1863, suffering from an affection of the throat of about three months’ standing. Her general health was good. In September she caught cold but recovered. In October her hoarseness returned, and gradually increased. There was slight dyspnœa occasionally, and some feeling of constriction in the throat. Dr. Simrock pronounced the case to be one of polypus of the larynx.

Laryngoscopy by artificial light showed “a red roundish tumour springing forth from between the upper and lower

¹ See ‘Growths in the Larynx,’ Op. Cit.

vocal cords," and apparently taking origin by a rather broad pedicle from the ventricle of Morgagni. Its surface appeared uneven and granular. Laryngoscopy by sunlight showed "that the tumour, instead of being pedunculated, was sessile, with its broadest diameter on the floor of the ventricle."

A particle of the tumour was removed, "the microscopical examination of which showed it to be unmistakably cancerous." "The mass consisted of a well marked fibrous stroma, having alveoli which were filled with cells having large nuclei."

On the 28th of February, 1863, ether having been administered, an incision five inches in length was made in the median line from above the level of the thyroid cartilage to within two inches of the sternum. The larynx and the trachea as low as the third ring were laid bare. The trachea was opened (the isthmus of the thyroid gland having been divided), and a tube with a slit along the upper wall was inserted. The incision "was then extended by means of a probe-pointed bistoury, through the cricoid cartilage, crico-thyroid membrane, thyroid cartilage and thyro-hyoidean membrane, as far as the os hyoides, dividing the base of the epiglottis."

Considerable cough, spasm, and vomiting followed, and some of the vomited matter passed down into the trachea.

The divided alæ of the thyroid cartilage having been pulled apart, "the growth presented itself as a rounded fleshy looking excrescence about as large as the end of the little finger springing forth from the left ventricle, projecting rather more than a quarter of an inch into the cavity of the larynx, and overlapping and concealing from view both the upper and lower vocal cords."

The growth was cut off with a pair of curved scissors at the level of the lower vocal cords, which were apparently healthy. Further examination showed that "the tumour had a very broad attachment to the cartilage forming the floor of the ventricle."

After extirpation as complete as possible by scissors and forceps the actual cautery was applied. The wound was

closed by sutures except at the lower part where a double canula was inserted.

The after progress was in every way satisfactory. On the fifth day the tube was removed. On the tenth day the patient sat up.

At the end of four weeks the patient "left the hospital, having meanwhile regained her voice to a very great degree."

"The patient remained in good health for a long time after the operation. Her voice never regained its natural tone, although it acquired a very considerable degree of resonance." Laryngoscopic examination showed no indication of return of the growth.

In October, 1864, signs of cancerous cachexia accompanied failing of general health; and on the 4th January, 1865, more than twenty-two months after the operation, she died.

Post-mortem examination showed cancer of the left kidney and ureter, as well as of the right and left supra-renal capsules. In the larynx there were no signs of any return of the growth.

"The growth removed from the larynx was soft, vascular and succulent, and its microscopical characters were evidently cancerous. It consisted of a delicate framework of connective tissue, the meshes of which were filled with cells of various shapes and sizes containing large nuclei and nucleoli."

CASE 2.—Polypoid Growths; Repeated attempts at removal through Mouth; Laryngotomy; Renewed attempts; Thyroid divided; Growths removed. Result successful; Respiration perfect; Voice good and improving.

('Wiener Med. Wochenschr.,' 1st February, 1865, p. 147; Planchon, *op. cit.*, p. 58; 'Berlin Klinische Wochenschrift,' No. 52, December, 1864. Drs. Ulrich and Lewin.)

N. J—, æt. 16, came under observation in 1864. There had been loss of voice, and increasing dyspnœa during four

years. Repeated attempts were made by Dr. Lewin, to remove a growth (which was recognised by aid of the laryngoscope) through the mouth, but only small fragments could be got away. The growth itself, which appeared as large as a hazel-nut, resisted all efforts to extract it. The difficulty was increased by the abnormal smallness of the throat and larynx. The growth appeared to be attached to the left false vocal cord.

On the 8th October, laryngotomy was performed, and a tube introduced through the crico-thyroid membrane; and further attempts were made to remove the growths through the mouth, but these failed as before.

On the 31st October, chloroform having been administered, the thyroid cartilage was divided in the median line, and the parts being separated, the growths were removed in two portions by scissors. The growths were situated in the ventricles, being attached to the vocal cords. They had the appearance of fine-pointed condylomata. Caustic was applied to the points of attachment. The tube was replaced, and the wound closed by sticking plaister. On the third day, the tube was removed.

On the 23rd November, the wound was almost completely cicatrised, the firmness of the larynx showing that the divided halves of the thyroid cartilage had become firmly united. Respiration was perfect, and the voice returned and gradually improved; at the time of the report, however, though the patient spoke plainly, it was in a somewhat bass voice.

It is worthy of note that only a comparatively short time had elapsed since the operation, and that, therefore, there might in all probability be expected a greater improvement in the voice after a longer interval.

CASE 3.—*Papillomata (probably congenital); Tracheotomy; Thyroid and Cricoid Cartilages, &c., divided; Growths removed; Recurrence of Growths; Second Operation; More*

Growths removed. Result successful ; Respiration perfect ; Voice good, but not perfect.

(‘New York Medical Journal,’ September, 1867, vol. v, No. 6.
Dr. Gouley, New York.)

Emma W—, æt. 6, came under observation on the 7th December 1864. At the age of three months (May, 1859) she “took a severe cold.” She suffered from considerable dyspnœa and was quite ill for some time. At the age of twelve months (February, 1860) she was seized with attacks of dyspnœa, generally worse at night. These attacks increased in severity and frequency. At the age of about eighteen months, (June, 1860) she had an attack of pneumonia, for which she was blistered, &c. Improvement in her breathing followed, and she was to all appearance restored to health. In 1862, she had inflammation of the bowels, followed by ischio-rectal abscess, during the progress of which she screamed violently from pain. To this the parents attributed the return of her dyspnœa and hoarseness.

In February, 1864, she was treated for what was supposed to be diphtheria. From this period “dates the commencement of her aphonia, which increased gradually until she could only speak in a husky whisper.” In October her strength began to fail, the dyspnœa rendering her restless and sleepiness at night. “During some of the paroxysms of dyspnœa she became frantic and unmanageable, and grasped everything that came in her way like one drowning.”

On the 8th December 1864, tracheotomy was performed, the patient being under chloroform; and a canula was secured in position. Respiration was carried on easily and freely through the canula. Laryngoscopic examination (by Dr. Simrock) showed, “several whitish looking pedunculated growths above the vocal cords. These growths were isolated and of different sizes, but not one was larger than a small pea.” Owing to the inclination of the epiglottis perfect exploration was impossible. The introduction of other instruments, besides the laryngeal mirrors, was so stre-

nously resisted that there was no chance of detaching the growths or any portions, and bringing them away through the mouth. In the course of the next two months the growths increased very rapidly.

February 26, 1865.—Ether having been administered, an incision was made through the soft parts on to the larynx; the canula was then withdrawn from the trachea, and a blunt-pointed bistoury introduced through the opening, and carried upwards through the rings of the trachea and the isthmus of the thyroid body. A portion of the growth was seen between the divided portions of the upper rings of the trachea. The probe-pointed bistoury was again introduced; by its means were divided successively from below upwards, and from within outwards, the cricoid cartilage, crico-thyroid membrane, thyroid cartilage, thyro-hyoid membrane, and the base of the epiglottis. On separating the cut edges, the morbid growths having the appearance and consistency of cauliflower excrescence were at once seen filling the laryngeal cavity and tightly impacted therein. They extended upwards beyond the rima glottidis, and could be felt by the finger inserted through the mouth. The principal tumour one inch in length, and one-third of an inch in its greatest transverse diameter, was attached by a narrow peduncle to the right inferior vocal cord, and to nearly the whole length of the left inferior vocal cord; it had also a broad attachment to the left ventricle, and half filled the ventricle. There were also ten or a dozen smaller growths. All were carefully removed by curved scissors. Persulphate of iron was applied, the tube reintroduced into the trachea, and the upper part of the wound closed by silk sutures.

Very little general disturbance ensued. During the first two or three days some of the fluid attempted to be swallowed passed through the upper part of the wound.

March 8th.—The wound was nearly closed; the patient was up and playing about the room. The orifice of the tube was corked, and she breathed freely through the natural passages.

16th (Eighteen days after the operation), the tube was

removed, and the patient could speak in a whisper. In the course of a few weeks she could make herself distinctly heard and understood.

About the end of August, there was recurrence of embarrassment in respiration and voice, and laryngoscopic examination showed recurrence of the disease.

In November (nine months after the first operation), ether was administered, and laryngo-tracheotomy was repeated; several tumours were excised as before, but they were smaller than those removed previously. "The sum of all the growths removed on the last occasion would not exceed one half of the volume of the first crop." After excision of the growths, chromic acid was freely applied. The upper part of the wound was closed and a tracheal canula inserted. No untoward symptoms occurred. The wound healed favorably, but not so rapidly as on the first occasion. Five weeks after the operation laryngoscopical examination showed the vocal cords to be quite free from any outgrowth, but irregular and crippled. The tube was withdrawn three months after the operation.

In July, 1867 (twenty months after the last operation), the child was in excellent health, breathing freely, and able to speak in a loud and very distinct whisper, so as to be heard in any part of the house.

Laryngoscopic examinations showed no recurrence of growth, but some irregularity of the vocal cords.

CASE 4.—Polypoid Excrescences (? Cystic Growths); Thyroid Cartilage and Crico-thyroid Membrane divided; Growths removed. Result successful; Respiration perfect; Voice good, but low.

('Wiener Med. Wochenschr.,' 28th June, and 1st July, 1865; 'British Medical Journal,' September, 1865; Planchon, op. cit. Gilewski, Cracow.)

A girl, æt. 16, was first seen in 1864. During several months there had been hoarseness and noisy respiration especially during sleep. Laryngoscopic examination showed

three polypoid excrescences at the anterior angle of the glottis. These had a half fleshy, half mucous appearance. Two were larger than pins' heads, the other was about as large as a pea.

In December, 1864, the crico-thyroid membrane and the thyroid cartilage were divided in the middle line, and the larynx opened. It was then found that the mucous-like polypus which under laryngoscopic examination had appeared as large as a pea, was reduced to two small pale fragments of areolar tissue. It had been observed that a small quantity of watery fluid escaped at the time the thyroid was incised. This fluid was probably the contents of a cyst which had constituted the tumour. There was also found a small hard pale-coloured excrescence, as large as a pin's head. This was removed by scissors. The edges of the wound were brought together by sticking-plaster. No constitutional disturbance ensued, and the patient breathed freely. There was slight difficulty in swallowing.

The wound united and perfectly closed during the third week, and the voice gradually became more and more distinct. Respiration being free from the first. Three months after the operation the voice was becoming clear, but was still somewhat low in tone (*un peu grave*).

In this case it would appear that any attempt at removing the growths through the natural passages was prevented by the sensitiveness of the parts, and by the position of the epiglottis which interfered with the distinct and complete laryngoscopic view of the interior of the larynx.

Some months after the operation, it is stated, there was hoarseness again, which, however, was to be attributed to an acute catarrh.

CASE 5.—*Epithelial Growths (Non-Malignant); Tracheotomy; Thyroid and Cricoid Cartilages, &c., divided; Growths removed. Result successful; Respiration free; Voice natural.*

('Wiener Med. Wochenshr.,' 11th November, 1868; Planchon, op. cit., p. 73. Balassa, Pesth.)

Catherine O—, æt. 44, came under observation for the

first time on the 23rd June, 1865. She had taken cold from drinking cold water when she was hot, and consequently had suffered from sore throat, with difficulty of swallowing and hoarseness. Some weeks afterwards she could only speak and breathe with great difficulty. The dysphagia subsided; the other symptoms persisted. In previous years she had suffered from time to time from similar symptoms which, however, had subsided. Some years previously she had been cured by operation of nasal polypus.

On admission she was suffering from aphonia, and difficult and painful respiration, and dysphagia. Laryngoscopic examination showed swelling of the mucous membrane of the pharynx and larynx, œdematous encroachment on the glottis from abnormal condition of the mucous membrane. &c.* Under treatment the symptoms were considerably ameliorated.

24th July.—The patient was again admitted, with recurrence of unfavorable symptoms. Laryngoscopic examination showed that the contraction had greatly increased in extent, and that the cavity of the larynx was closed. A night of extreme suffering from urgent dyspnœa and impending suffocation was passed.

The next day the trachea was first opened, and a canula introduced. The incision through the skin, &c., was then prolonged upwards as far as the hyoid bone, and the median line of the larynx was laid bare. Then by means of a blunt-pointed bistoury, introduced above the opening in the trachea, the larynx was severed along the middle line, and the divided edges were held apart. Many excrescences (like bunches of grapes) were then seen adhering to the interior of the larynx. These were cut off by scissors. There were five in all, two large and three small. The largest about the size of a pea was the one that had been seen in the laryngeal mirror between the lips of the glottis. The others were in the

* A full description of the laryngoscopic appearances is given, but not quoted here, as having no important bearing on the operation; and, further than that, the general swelling concealed the growths subsequently discovered.

ventricles. The wound above the canula was closed by sutures and sticking plaister.

Microscopical examination, by Professor Margo, showed the growth to be epithelial in structure.

During the first few days there was some difficulty in swallowing, and sometimes liquids passed into the air-passages and through the canula, producing fits of coughing. Otherwise the progress was satisfactory. On the sixth day the patient left her bed, and could speak audibly when the orifice of the canula was closed by the finger. Laryngoscopic examination showed great improvement in the condition of the larynx.

Twenty-one days after the operation respiration was free even when the canula was removed and the opening closed by the finger. The voice was clear, and deglutition perfect. Laryngoscopic examination showed that the parts had all but recovered their normal appearance.

On the 25th August (thirty days after the operation), the canula was finally removed. The wound soon entirely closed; and the patient left the hospital in full enjoyment of voice and respiration.

She was seen subsequently in October, 1865. A small wart, the size of a lentil, was discovered. This disappeared entirely after cauterization. It is not distinctly stated whether this was internal or external, but probably the latter, inasmuch as the larynx is stated to have been quite normal, and the wart is referred to as appearing on one point in the linear cicatrix of the wound.

CASE 6.—Epithelial Growth; Attempts at removal through Mouth; Thyroid Cartilage divided (without Tracheotomy); Growth removed. Result successful; Respiration free; Voice pure and sonorous.

(‘Wiener Med. Wochenschrift,’ 18th November, 1868. Planchon, op. cit., p. 60. Balassa, Pesth.)

Joseph H—, chimney-sweeper, æt. 32, was first seen on the 5th November, 1866. Four years previously he had caught cold, become hoarse, and suffered from dyspnœa and cough.

He had a sensation of a foreign body (movable) when he wished to expectorate. His trouble gradually increased. On admission his respiration was difficult, and his voice hoarse; during deep inspiration a trembling noise was heard. From time to time he had paroxysms of cough, with mucous expectoration.

Laryngoscopic examination showed a rounded tumour the size of a small hazel-nut coming from the right ventricle, half filling the glottis, attached by a largish base, sometimes purplish, sometimes red, with a mulberry-like surface, and trembling during the passage of air. Attempts were made to surround the growth with the platina wire of the galvanocaustic apparatus. But all attempts failed. The patience of the sufferer was exhausted, and his sufferings were severe.

Operation.—The median line of the larynx being laid bare, the wall was cut through gradually by gentle strokes of a bistoury. A slight transverse incision was carried through the crico-thyroid membrane along the lower border of the thyroid cartilage. The separation of the divided parts by blunt hooks brought into view the tumour (a purplish epithelioma) pressed against the right vocal cord, and trembling at the passage of the current of air. The tumour was at once removed, and the wound after its removal was exactly above the vocal cord; in size it was about as large as a haricot bean. There was little bleeding. The wound was closed by metallic sutures and plaister except at the lower part, where it was left open to the extent of a line and a half in case of accident.

The lower part of the wound remained open during thirty-six hours. The rest healed by primary union. The cure was complete in eight days; and the patient left the hospital with pure and sonorous voice, and free respiration.

In this case tracheotomy was not performed as a preliminary, nor was a tracheal tube introduced after the operation.

This case is remarkable for the rapidity with which the cure was accomplished, as well as for the perfect success of the result.

CASE 7.—*Epithelial Growths ; Prolonged and repeated Treatment through the Mouth ; Tracheotomy ; Thyroid and Cricoid Cartilages, &c., divided ; Growths removed ; Recurrence of Growths ; Repetition of Operation, without Tracheotomy ; Thyroid Cartilage and Crico-thyroid Membrane only divided. Result successful ; Respiration free ; Voice good.*

(‘Wiener Med. Wochenschr.,’ 14th November, 1868; Planchon, op. cit., pp. 62 and 79. Balassa, Pesth.)

Fanny F—, a domestic servant, æt. 21, came under observation 29th January, 1867. Two and a half years previously she caught cold, suffered from severe fever, and her voice became hoarse. Medical treatment diminished the evil, but her voice remained suppressed, and her breathing difficult, with pain in the upper part of the chest.

On the 25th of May tracheotomy was performed. The thyroid cartilage was then incised in the middle line (also the cricoid, and the crico-thyroid membrane), and the growth was removed in five different portions, of which one was as large as a small pea, and the others smaller.

After the operation there was both local and general disturbance. An energetic production of vegetations took place about the wound in the trachea. The wound in the larynx healed rapidly, and without difficulty.

The vegetations about the wound in the trachea, which appeared internally as well as externally, were vigorously cauterized.

The tube was removed at the end of five weeks. When the patient left the hospital at the end of the Clinique there was a vegetation of the size of a pea on the trachea. The voice was sonorous, the respiration free.

For some months the patient went on well, having returned to her occupation ; but after the first half of the winter she again lost her voice, and experienced great difficulty in breathing.

Laryngoscopic examination showed a new growth, granu-

lous in appearance, with a large base, and purplish blue in colour, under the angle of the inferior vocal cords, and springing from the seat of the wound in the trachea. Violent paroxysms of cough, threatening asphyxia, were frequent, especially in the night.

Second admission, 4th February, 1868.—On admission the patient was aphonic; her respiration difficult and painful,—more difficult during the night. Sometimes she suffered from paroxysms of spasmodic cough, during which her countenance became livid. Laryngoscopical examination showed the superior and inferior vocal cords apparently normal, but the cavity of the larynx below the true vocal cords filled with a growth rising from before backwards, whitish-yellow in colour, irregularly rosy, and rugose with granular elevations. Repeated cauterizations with solutions of nitrate of silver, &c., of varying strength, were applied. The cauterizations are said to have diminished the consecutive inflammation of the mucous membrane. But the growth increased, and the sufferings of the patient became more severe, and her condition urgent.

Second operation.—On the 30th of February, 1868, the larynx was again opened by careful incision along the line of the old cicatrix. There was no tracheotomy performed as a preliminary. After the median section of the thyroid a transverse incision was made through the crico-thyroid membrane. The growth was removed in three or four portions by means of scissors, and the wound was then at once and entirely closed by sutures (some applied through the cartilage?).

The progress of the case presented no difficulty. The sutures were removed on the 7th June, and the patient left the hospital on the 23rd June, breathing freely, and having recovered her voice.

Microscopical examination of one portion showed a fibro-cellular structure, with elastic fibres and connective-tissue-corpuscles in great abundance, and on the surface an epithelial layer. Another portion showed fibres in fasciculi interspersed with cells, fatty granules, and large oil-globules.

Another showed fat-cells and gland structure with fibres and connective tissue.

This remarkable case illustrates forcibly the small amount of danger attending the operation.

It is worthy of note that the tracheotomy, which was performed as a preliminary to the first operation, seems to have been hurtful rather than useful.

The trachea was not opened at the second operation, nor does it appear that the cricoid was cut, and yet if it were not it is difficult to understand how the growths were reached.

CASE 8.—*Sarcomatous Growths ; Tracheotomy ; Thyroid and Cricoid Cartilages, &c., divided ; Growths removed. Result successful ; Respiration free ; Voice good.*

(‘Wiener Med. Wochenschr.,’ 14th November, 1868; Planchon, op. cit., p. 77. Balassa, Pesth.)

Maria D—, æt. 19, first came under observation 29th April, 1867. She had caught cold from sleeping in the open air three years previously, and had become hoarse and had pain in her throat. Her hoarseness continued ; and bye-and-bye difficulty of breathing supervened. These symptoms gradually became worse.

On admission her voice was much obscured ; her respiration was whistling ; and she had frequent attacks of threatened suffocation. Laryngoscopic examination showed the epiglottis swollen, and of a sombre red colour ; the superior vocal cords normal ; the inferior visible throughout their extent ; the cavity of the larynx occupied below on each side by a whitish growth, having a granular aspect ; in front the borders of these growths almost touched, behind they were progressively further apart. These growths were exactly beneath the inferior vocal cords.

On the 30th April, 1867, tracheotomy having been performed as a preliminary, the operation was carried out as in the preceding case, and the growths were removed in a similar manner. The growths were removed in five or six pieces, varying in size from that of a lentil to that of

a pea. They had the consistency and appearance of *sarcomata*. Microscopical examination was not made, the growths being lost. There was some bleeding, which was arrested by pieces of sponge. The wound was closed by sutures.

Slight febrile disturbance followed; and a great quantity of mucus escaped during frequent attacks of cough. After the first night, however, all went well. The wound healed by first intention. The swelling within the larynx around the wound, due to the ablation of the tumours, only disappeared little by little; and the canula could not be removed until the middle of the third month. At that period respiration and voice were in their normal condition, and on the 17th of July the patient left the hospital. The laryngoscope showed a remaining portion of new growth at the situation of the cicatrix of the trachea.

A small portion of growth appeared to have been left or to have sprung up afresh.

CASE 9.—Papillomatous Growths on Vocal Cords; Attempted removal through Mouth; Inflammatory Swelling produced; Tracheotomy; Thyrotomy (Cricoid not divided). Result successful; Respiration free; Voice regained; Recurrence of Growth two and a half years afterwards.

(From 'Growths in the Larynx,' by Morell Mackenzie, M.D. London, 1871, p. 162. Mackenzie and Couper, Norwood and London.)

Miss B—, æt. 66, was first seen 21st April, 1868. She was suffering from frequent attacks of very severe dyspnœa. Her voice had been lost since 1854. Laryngoscopic examination showed "a large, bright red, lobulated growth, about the size of a gall-nut, blocking up the anterior two thirds of the glottis."

29th April.—Miss B— came to town. On six occasions large fragments of the growth were removed by forceps through the mouth, but after the operation on 18th May so much inflammatory swelling took place that Dr. Mackenzie "did not consider it safe to pursue this method of treatment any further."

21st May.—A very severe attack of dyspnœa came on in the evening. Similar attacks came on whenever she began to doze.

22nd.—Tracheotomy was performed by Mr. Couper and a canula inserted. Local anæsthesia was employed; chloroform was not administered.

Half an hour after the insertion of the canula Mr. Couper divided the thyroid cartilage in the middle line. The larynx being held open by retractors, Dr. Mackenzie seized the growth with strong short forceps, and took away the greater part of it. The base was then cut more cleanly away with curved scissors. The alæ of the thyroid were united by silver sutures.

“The patient was relieved by the operation of all dyspnœa, and only complained of some soreness and slight difficulty in swallowing for a few days;” “she seemed to get well without any trouble.” The voice was entirely regained, and the patient “remained quite well for two and a half years, *i. e.* until the autumn, 1870.” At this period laryngoscopic examination showed commencing recurrence of the growth. The growth slowly increased during the winter 1870-71.

CASE 10.—Growths (? of Syphilitic origin); Attempts at destruction and removal through Mouth; Tracheotomy; Larynx opened and Growths removed; Indications of recurrence; General and local Treatment. Result successful; Respiration perfect; Voice not materially affected.

(‘Virchow’s Jahresbericht,’ Berlin, 1870, Band II, p. 117; quoted from the ‘New York Medical Records,’ August, 1869. Cohen, New York ?)

The patient, a merchant, first seen in 1868 (?), had been suffering from hoarseness for three weeks. Laryngoscopic examination showed a grayish-white smooth tumour, the size of a bean, occupying the whole length of the left vocal cord. This was cauterized, and, as the result,

was divided into two portions, one of which was coughed up, and was found on microscopical examination to be epithelial in character. After further cauterization with chloride of zinc the tumour increased, and resort was had to the galvanic cautery. By means of this several portions were removed, in which, however, epithelial cells were not found. In spite of (or in consequence of?—A. E. D.) these methods of treatment the growth continued to increase until it had reached the size of a hazel-nut.

Laryngotomy, preceded by tracheotomy, was performed, and the new growth was removed. The part from which it grew was cauterized. In the course of a fortnight the growth began to spring up afresh.

Under such circumstances it was determined to desist from further operation, and change of climate was advised. The patient was sent to travel in Europe, and directed to take iodide of potassium, and to insufflate tannin twice a day, he having been taught autolaryngoscopy in order that he might do this. While in Europe he took and inhaled sulphurous waters, and dilute caustic solutions were applied. Nothing further was done.

After his return from Europe the general health of the patient was as good as the condition of his larynx was satisfactory. Minute traces in the larynx of the different operations were the sole indications of the now surmounted malady, but these did not materially affect the voice.

It may be considered doubtful, perhaps, whether or not the growth in this case was not of syphilitic origin; and if so whether it was not to the iodide of potassium and the sea voyage, &c., that the cure must be attributed rather than to the operation.

Respecting this case Mackenzie says simply, "Condition of voice not stated." "Recurrence began to manifest itself a fortnight after operation."

Now, the condition of the voice is alluded to very plainly, and Mackenzie omits to state that the patient returned after a voyage to Europe with only minute traces of the various operations in his larynx.

CASE 11.—*Polypoid Growth ; Thyroid Cartilage and Cricothyroid Membrane divided ; Growth removed. Result successful ; the Voice good, but harsh.*

(‘Berlin Klinische Wochenschrift,’ 7th December, 1868, p. 501.
Navratil, Pesth ?)

R. B—, a clergyman, was first seen in 1868. The patient was suffering from a polypus the size of a bean on the under surface of the left vocal cord, which became most distinctly visible during forced expiration and phonation. During tranquil breathing only a slight elevation of the vocal cord was visible.

Operation.—The crico-thyroid membrane and the thyroid cartilage were divided along the middle line, and the two portions held apart. Considerable spasm ensued, and a quantity of blood flowed into the larynx. The growth was thus for a time concealed from view. In consequence, too, of the convulsive cough the right vocal cord was slightly injured anteriorly. The polypus was at length seized, and cut off with scissors. Nitrate of silver was applied to the surface from which it had been cut off, and the wound was closed by sutures and sticking plaster.

The patient recovered quickly from the effects of the operation, and the wound healed by first intention in the course of a few days. A small slough separated from the part where the vocal cord had been accidentally injured, and left a small breach of continuity. The place where the polypus had been healed up entirely.

The voice remained harsh and hollow, in consequence, probably, of the above-mentioned notch in the vocal cord, this permitting air to pass through, and thus giving rise to want of clearness of tone.

CASE 12.—*Polypoid Growth ; Thyroid Cartilage divided ; Growth removed. Result successful ; Respiration evidently perfect (no mention being made) ; Voice good.*

(‘Berlin Klinische Wochenschrift,’ 7th December, 1868, p. 502.
Navratil, Pesth ?)

S. A—, a merchant, æt. 30, came under observation in

1868. A polypoid growth the size of a pea was seen by aid of the laryngoscope on the lower border of the left vocal cord. Navratil resolved to remove it after opening the larynx, on account of the difficulty of getting at it through the mouth.

Operation.—Local anæsthesia by means of æther was produced, the superficial incisions were made, and the thyroid cartilage was divided. Spasmodic contractions of the muscles ensued, which rendered difficult the further progress of the operation. After some time the polypus was seized and cut off. The wound was closed by sutures and sticking plaister.

On the second day the patient suffered from severe febrile symptoms, and the wound in the neck discharged bloody matter, the parts becoming œdematous. Some blood, &c., was coughed up. During the following days a profuse discharge of offensive matter took place and the œdema increased. Swallowing became difficult.

On the sixth day the constitutional disturbance subsided, and the swelling of the neck decreased. The appetite returned, and all went well. At the end of four weeks the wound entirely healed.

On laryngoscopic examination the vocal cords appeared perfectly normal, but somewhat sluggish in their movements. Some inflammatory swelling was observed about the anterior angle. The voice during the day was quite clear, but somewhat hard and hoarse in the morning. Insufflations of tannin were ordered, and the patient left the hospital.

CASE 13.—*Polypoid Growth; Thyroid divided (without Tracheotomy); Growth removed. Result successful; Respiration and Voice normal.*

(Planchon, 'Faits Cliniques de Laryngotomie,' Paris, 1869, p. 33; also 'Med. Times and Gazette,' 20th November, 1869. Abstract of Communication to Surgical Society, Paris. Krishaber, Paris.)

Charles B—, æt. 38, was first seen on the 2nd December, 1868. Eight years previously he had begun to suffer from

cough, at first slight, subsequently more severe, and during the winter convulsive. After severe exposure to wet, he had lost his voice, but after a time had partially regained it. The high notes were lost, the low ones obscured. His voice was often muffled and hoarse. His general health was good. This state of things continued during six years without notable change for the worse.

During the last two years the embarrassment of breathing coming on with the cough had become obviously increased; the fits of coughing had become more and more frequent; and his voice was becoming extinguished, having progressively diminished in intensity and resonance.

In September, 1868, the symptoms all became aggravated, —the paroxysms of cough much more frequent. The advice of Dr. Ruffey was sought, but no material improvement being effected, Dr. Krishaber was consulted on 2nd December.

At that period the voice was hoarse; the respiration noisy; the cough frequent and convulsive; a long inspiration occurred at the end of each phrase of speech; there was a general sense of uneasiness; and the patient was pale and thin.

On laryngoscopic examination an isolated polypus was seen situated on a level with the anterior attachment of the vocal cords in such a way as to conceal a portion of the right vocal cord. This showed itself in a manner varying with the state of the glottis. It disappeared almost during inspiration, and seemed only as large as a pea, with an irregularly ovoid contour. During normal voice sounds the tumour enlarged and concealed two thirds of the right and one fourth of the left vocal cord. During an attempt at a high note, which could not be produced, the tumour stretched out so as to cover the greater part of the boundaries of the glottis. The sound produced was very hoarse. On further examination the tumour, when it partially disappeared, did not pass below the vocal cords, but into the ventricle, whence it issued on attempting high notes. It was club-shaped, not quite regular in contour; grayish in parts, elsewhere white.

Several attempts were made to extract the growth through the mouth. Forceps (Mathieu's), opening antero-posteriorly, were first tried, without success. Next the tumour was seized by forceps opening laterally, and small portions were torn off; but the tumour itself was so tough that it was impossible to pull it from its attachments. Next repeated cauterizations were tried, with only ill results. A further attempt at extraction was made, but without success. All these abortive attempts were perseveringly made during two or three weeks, or more; and then, on February 9th, 1869, the larynx was opened and the tumour extracted as follows:—An incision was made on to the thyroid cartilage, which was then divided in the middle line by scissors. The upper two thirds of the cartilage were easily divided, the lower third with difficulty, it being ossified. It was broken rather than cut through. The tumour was then easily brought into view, seized by forceps, and cut off by scissors at the root. The attachment of the tumour was in the ventricle of Morgagni.

Respiration immediately became normal, and the lips of the wound being held together the patient was able to sing up the scale.

The crico-thyroid and thyro-hyoid membranes are said not to have been cut. The trachea was not opened, nor does it appear that any canula was introduced.

Sutures were applied, but they had to be at once removed.

Perfect reunion of the edges of the wound, gradually extending from above downwards took place. On the fifteenth day all was closed except a small opening that would admit a goose quill. On the thirty-ninth day union was complete.

On the forty-first day all the indications of a healthy condition were present; the breathing was free, the voice normal, the cough gone. Laryngoscopical examination showed that the vocal cords presented a normal appearance.

Microscopical examination of the growth by M. Ranvier showed the characters of a fibrous tumour containing a considerable number of glands.

CASE 14.—*Polypoid Growth ; Tracheotomy ; Thyroid and Cricoid Cartilages, &c., divided ; Growth removed. Result successful ; Respiration perfect ; Voice good, though hoarse.*

(‘Transactions New York Academy of Medicine,’ vol. iii, Part 10, 1870. Gurdon Buck, M.D., New York.)

John McG—, a coachman, æt. 38, was first seen 15th April, 1870. His voice was reduced to a hoarse whisper ; his respiration was obstructed and laboured. He was thin and sallow. For years past his colds had been attended by violent coughing. Three or four months before admission his voice had began to be affected, and his breathing to be disturbed. These symptoms had gradually become aggravated. His sensations referred to the larynx as the seat of his trouble. Laryngoscopical examination showed a growth in the cavity of the larynx below the vocal cords. Palliatives were used until 22nd, but without good effect. The dyspnœa increased ; and suffocative exacerbations became more severe and threatening. The danger of suffocation seemed so urgent that it was decided to resort to tracheotomy without further delay.

First operation, 23rd April, 1870.—Tracheotomy was performed without etherization, and under urgent circumstances. The two first rings of the trachea and the cricoid cartilage were divided in the median line, and then the cricothyroid membrane was cut transversely by a T incision. A tracheal tube was introduced, and respiration through it became tranquil.

Second operation, 24th April.—After etherization the thyroid cartilage was exposed by continuation upwards in the middle line of the incision made on the previous day. A grooved director was passed through the existing opening into the larynx from below upwards, and the thyroid cartilage was divided along the median line by a pair of scissors curved edgewise, and the incision was continued upwards through the thyro-hyoid membrane. On drawing the divided portions apart the whole cavity of the larynx seemed filled by the growth ; further examination showed that it

occupied the right wall of the larynx, involving the ventricle and both cords, underneath which it had originated, and which it had elevated and pushed inwards. A small pedunculated portion emerged from between the cords, and protruded further into the cavity of the larynx. To remove the mass an incision circumscribing its base, extending half an inch below the inferior vocal cord, was carried down to the cartilage, from the surface of which the whole mass was detached from below upwards. After dividing its connection above, it was found that the right arytenoid cartilage had been excised, and formed a part of the mass removed. Two or three suspicious points were touched with the actual cautery. Sutures were applied over the thyroid cartilage, and pins above and below the tube, which was left in the trachea. The growth was of firm consistency, and found to be made up of small, round, nucleated cells, about the size of lymph-cells, imbedded in a tolerably abundant fibrous stroma.

The after progress was so favorable that in three or four days the patient was up and about. *Respiration easy, voice much as before the first operation.* He wore a hard rubber tube of median size, corked at the outer extremity.

25th May.—The tube accidentally broke off from the collar-piece and fell into the trachea. No alarming symptoms, however, immediately followed, and it was thought the tube might have got into the œsophagus and been swallowed.

1st June.—Auscultation of the chest showed signs of chronic pulmonary mischief on the right side, due, probably, to the presence of a foreign body.

2nd.—A long incision was made into the trachea, extending from the already existing opening. Professor H. B. Sands, having introduced his fore finger, could just feel the foreign body. A long slender pair of dressing forceps bent edgewise at an obtuse angle being then introduced, the tube was seized and extracted. The wound was closed by sutures. At the end of three or four days the patient was up again, and about the ward.

17th.—Wound healed above and below tube.

27th.—Laryngoscopical examination showed the glottis patulous; the mobility of left cord was normal, its excursion in approaching the right side exceeded the middle line.

2nd July.—Tube removed.

26th.—All healed.

On the 14th October the general health of the patient was excellent, and his voice improved. Some words were now articulated in a clear tone, whereas previously his articulation had been exclusively in a rough and hoarse whisper.

7th December.—The voice was further improved. Articulation was loud, and no longer whispering, though still hoarse. *Respiration* easy and natural.

“An important point in this case is the condition of the voice after the removal of the vocal cord and arytenoid eminence of the right side. In this respect the case is believed to be unique.”

Report of laryngoscopical examination, by Dr. R. F. Weir. —“The left vocal cord is drawn beyond the median line towards the opposite side in phonation. The cicatrix presents a sharp curved line, running backwards and appearing to be attached to the opposite arytenoid cartilage, and lost in the adjacent pharyngeal tissues. The bridle-like cicatrix moves slightly to meet the remaining vocal cord in phonation.”

CASE 15.—*Sessile Growths; Attempts at removal through Mouth; Thyroid Cartilage, &c., divided; Growths removed. Result partially successful; Great benefit for a time; Voice clear, but coarse; Indications of recurrence sixteen months afterwards.*

(‘Boston Medical and Surgical Journal,’ 18th February, 1869, vol. iii, No. 3, p. 37. E. Cutter, M.D., Boston.)

Albert L—, æt. 53, came under observation in April, 1867. In 1846 he was injured by overturning a large jar of bromine, “the vapour from which strangled him and almost deprived him of life.” “He attributes his subse-

quent laryngeal affection to the inveterate habit of smoking tobacco." No venereal taint.

In April, 1864, he became hoarse. Various methods of treatment were ineffectually adopted. "He had sleepless nights; he lost flesh, strength and energy, and became short of breath on exertion. He became indifferent to life and was tempted to suicide. He said that 'he felt like a man out in the open sea in a boat without oars or rudder, expecting every moment to be capsized.'"

In April, 1867, he came under Dr. Cutter's observation, who on laryngoscopic examination discovered the existence of "a sessile tumour, occupying the whole of the upper surface and free edges of the left vocal band, and a small portion of the right vocal band near the thyroid insertion."

"Attempts were made to remove a portion [of the growth] by the mouth, with little success."

On the 26th September, ether having been administered (while getting under the influence he appeared to have been somewhat violent), "an incision was made with a scalpel in the median line from the hyoid bone to the third tracheal ring." "The thyroid cartilage was found to be ossified. After the external hæmorrhage had ceased the lower blade of a bone forceps was entered through the crico-thyroid membrane exactly in the median line." "Simply closing the forceps with force sufficed to sever it cleanly in the middle. The section through the soft tissues was completed with the scissors." "The severed parts were held apart by hooks." "The new growth was completely revealed. On the left cord it appeared as a minute lobal excrescence, occupying the whole inner edge like a fringe and the lower or tracheal surface. On the right vocal cord the growth was similar, but close to the thyroid insertion. It proved to be fragile. The whole growth was removed by the scissors, leaving the surface clean and smooth." "The surface was then cauterized with the acid nitrate of mercury." As the effect of the anæsthetic passed off, the patient again became violent.

"The most remarkable feature of the violence was the

completeness of his prostration" [? phonation—A. E. D.]. "He spoke in a loud coarse voice, resembling that of a sea captain in a storm. This phonation lasted for several hours. The return to complete sensibility was retarded by the accumulation of blood and mucus in the mouth which ran down into the trachea, and out of the artificial opening. It was also accompanied by profuse sweating, and some flagging of the pulse. The wound was closed by five sutures through the skin only. The patient was then led to his bed in an adjoining chamber. He was faint and chilly, but his pulse was 80, regular and full." After vomiting a quantity of blood mingled with mucus, the patient assumed a more natural appearance. The after progress was very favorable.

29th September.—Wound united.

30th.—Sutures removed.

2nd October.—Patient downstairs.

5th.—Plaisters removed.

8th.—"Phonation coarse and clear."

17th.—"Under the laryngoscope everything appeared normal, except a slight oedematous protuberance towards the thyroid extremity of the left vocal cord."

23rd.—"The larynx looks very well inside, the vocal cords having their normal pearly sheen." Some adhesion of the cicatrix to the trachea was removed by subcutaneous section.

About sixteen months after the operation, *i. e.* in February, 1869, it is reported that "there is an appearance of a return of the disease on the right vocal cord."

This case is referred to by Dr. Mackenzie in the following terms: "Persistent dysphonia; recurrence of growths in less than a month after operation;" and in note—"Thyrotomy was performed in the first instance; but as the patient almost died under the operation from blood passing into the trachea, an extensive incision had to be made from the upper rings of the trachea to the thyro-hyoid membrane. Improvement in voice is reported; but as the growth recurred in less than a month persistent aphonia would probably more correctly describe the condition." I am unable to explain the discrepancies.

CASE 16.—*Growth; Thyroid and Cricoid Cartilages and upper rings of Trachea divided; Growth removed; Canula introduced. Result partially successful; Respiration perfect; no satisfactory (i.e. sufficient) information as to Voice.*

British Medical Journal, 4th November, 1871. Langenbeck, Berlin.)

Philip B—, æt. 28, came under observation in 1871 (?) after having suffered during three or four years. The malady had come on very gradually. Quite recently there had been such difficulty in breathing that, especially at night, he often had fits of asphyxia of several minutes' duration. He could swallow well. Laryngoscopic examination showed the entrance of the larynx free, the epiglottis normal, also the vocal cords; but below the vocal cords a swelling with a raw and uneven surface, was seen proceeding from the anterior commissure to the left, below the left vocal cord, involving therefore the left half of the larynx (*i. e.* its lower part).

On the 25th May, 1871, an incision was made through the crico-thyroid membrane, and extended upwards through the thyroid cartilage nearly as high as the attachment of the vocal cords, and downwards through the cricoid cartilage, and as low as the third ring of the trachea. The vocal cords were in no way injured. On opening the trachea the growth immediately showed itself. It was seized with forceps and cut off, and its situation was well cauterized with *Ferrum Candens*. The bleeding, which was slight, was easily arrested by a small sponge. A canula was introduced and the wound closed by sutures.

Bronchitis came on for a day or two, but gradually subsided; and all went well.

On the fifth day the canula was withdrawn, and the edges of the wound were brought together by adhesive plaister. Speedy recovery followed. "The difficulty in breathing has entirely vanished, and he now awaits his discharge, cured."

CASE 17.—*Warty Growths; Thyroid and Cricoid Cartilages divided (Laryngo-tracheotomy as a preliminary); Removal of Growths. Result partially successful; Respiration free, but Voice not restored.*

(Ehrmann, op. cit., p. 23. Ehrmann, Strasbourg.)

Caroline M—, æt. 33, first noticed an alteration in her voice in the autumn of 1840. She suffered from gradually increasing harshness and hoarseness of voice and finally became aphonic. But there was neither pain nor difficulty in breathing. Sometimes, however, by a quick inspiratory and expiratory movement she could cause a noise like that of a valve opening and shutting. Sometimes drops of liquid passed into the larynx, and excited violent fits of coughing. During such coughing small portions of tissue, similar to the growth afterwards extirpated, were sometimes expectorated.

During three years and a half there} was no serious symptom beyond the loss of voice; but in March, 1844, she was suddenly seized with extreme difficulty of breathing. It seemed to her that a mechanical obstacle prevented the free entrance and exit of air, and that a foreign body obstructed her throat. Temporary relief was obtained, but a fresh access of severe dyspnœa soon came on. Laryngo-tracheotomy (through the crico-thyroid membrane, the cricoid cartilage, and two rings of the trachea) was performed and a tube introduced. This was followed by immediate relief.

Two days after the laryngo-tracheotomy the opening made into the larynx was extended upwards through the thyroid cartilage and thyro-hyoid membrane as high as the hyoid bone. On separating the edges of the wound the growth, a cauliflower-like mass, with here and there rounded granulations on its surface, came into view. It was seized by forceps, and excised by means of a bistoury in three portions, which together made a voluminous mass. It was attached along the left vocal cord. The interior of the larynx appeared smooth, except where the growth had been attached. The movements of the arytenoid were free. The vocal

cords had not been injured by the knife. The lips of the wound were brought together by sticking-plaister (sutures do not appear to have been used). The canula was left in the lower part of the wound (as before).

The patient passed a comfortable night. The next day there was slight reaction, but the febrile symptoms speedily subsided. The day following the canula was removed, and respiration was performed easily through the natural passages. The third day the general condition was good; respiration free; deglutition easy; no pain; no swelling of the parts, but the voice still suppressed (*voilée*). On the twenty-first day after the operation no air passed by the wound, and the patient went into the country. On her return, at the end of eight days, the wound was completely healed, and her general health was perfect; but the aphonia persisted. During the following six months all went on well, the general condition being perfect, and respiration being altogether unembarrassed. In October the patient suffered from an attack of abdominal typhoid fever, under which she sank and died.

Post-mortem.—The examination proved the cause of death to have been typhoid fever, the ordinary lesions of the intestinal tract being present. The left vocal cord was a little shortened, and slightly puckered, and was prolonged under the form of raised *striæ* towards the base of the epiglottis; it appeared by such direction to diminish the extent of the corresponding ventricle. Some small granulations were situated along it on the folds of the mucous membrane; a granulation, somewhat larger and of vesicular appearance, was at the point of junction of the two vocal cords.

Microscopical examination of the tumour showed epithelial cells, squamous rather than cylindrical, and rare traces of fibro-plastic tissue mixed with the granulation elements.

This case certainly must be regarded as satisfactory in its results. There can be no ground for attributing the fatal issue in any way to the operation. It was clearly proved, not only by the symptoms, but by post-mortem examination, that death was due to typhoid fever.

CASE 18.—*Warty Growths ; Thyroid Cartilage divided ; Growths repeatedly cauterized. Result partially successful, but Voice apparently not restored.*

(Ehrmann, 'Histoire des Polypes du Larynx,' p. 12; from 'Journal de Græfe et Walther,' 1834, vol. xxi, p. 534. Brauers, Louvain.)

An architect, æt. 40, during the year 1833 had had embarrassment of respiration, which seemed attributable to a growth in the larynx. All sorts of remedies, external and internal were tried without benefit.

Operation.—The thyroid cartilage was divided throughout its length from below upwards ; a mass of warty growths was then brought into view filling up the laryngeal cavity. These were cauterized with acid nitrate of mercury.

After several days the growths had acquired such dimensions as to render respiration again difficult. The wound, almost closed, was enlarged by ablation of a portion of the thyroid cartilage. The tumours grew again and again in the places where they had been cauterized, and in direct proportion to the cauterizations. Lastly, the red-hot iron was applied. Slight inflammation of the interior of the larynx, but severe inflammatory engorgement of the posterior part of the organ causing compression of the œsophagus, ensued ; but in three days this subsided. As the result of successive irritations produced by repeated cauterizations, the larynx passed into a state of scirrhus induration. Hectic fever supervened, which seemed almost certain to prove fatal ; but this issue had not occurred when the physician who reported the case gave his account of it at Bonn.

Dr. Krishaber comparatively recently ascertained that the patient survived the operation more than twenty years, and died of a malady altogether unconnected with the larynx. ('Dictionnaire Encyclopédique,' art. "Larynx," p. 762.)

The early history of this case is not satisfactory. It is quoted by Ehrmann from the 'Dissertation' of Dr. Urner, to whom it was communicated by Professor Wutzer, to whom it had been told by "a Belgian physician," whose name is not given.

But even supposing the expected fatal result had ensued, surely such result must have been attributable to the after-treatment, the cauterization, &c., rather than to the opening of the larynx. It was the method of removing the growths, not the means employed for getting at them, that was in fault.

This case, therefore, has no bearing against the operation of opening the larynx for the removal of growths, but quite the contrary.

Commenting on this case Krishaber says, "It shows, 1st, the correctness of the diagnosis which led to the operation, without the aid of the laryngoscope; 2nd, the facility with which certain forms of polypus sprout out again and again after their partial destruction; 3rd, the necessity of conjoining the application of caustics with the performance of laryngotomy."

CASE 19.—*Papillomata; Thyroid and Cricoid Cartilages and upper rings of Trachea divided and Growths removed. Result partially successful, but Voice not restored. Death three months later; Cause not absolutely ascertained.*

(*Mémoires de la Société de Chirurgie de Paris*, 'T. vi, p. 561. Boeckel, Strasbourg.)

Marie F—, æt. 24, was first seen in June, 1863. During the winter of 1862 the patient had begun to suffer from chronic hoarseness. Towards the following autumn dyspnoea and harshness of voice supervened. In June, 1863, she was admitted into the *Maison de Santé*. A few days after her admission she was suddenly seized by an attack of suffocation so severe as to make it believed she was dead. After some minutes respiration was re-established, and the next day she was as usual.

Early in July laryngoscopic examination showed a grayish mammillated mass which filled the whole upper orifice of the larynx, being as large as a small walnut. On digital examination the growth appeared to be implanted by a large surface

on the left aryteno-epiglottidean fold. Some days afterwards a small fragment was coughed up, and the patient stated this had happened several times. The fragment on examination proved to be a portion of a papilloma or warty growth. The dyspnoea continued; inspiration was prolonged, and accompanied by hoarse sound. The patient wasted; the aëration of the blood was evidently defective; the voice was completely lost, but cough was rare.

20th July.—Repeated attempts were made to remove the growth through the natural passages by means of forceps and the wire snare; and after three or four successful efforts as much was removed as equalled in size a small walnut. The patient then, much fatigued, declared herself more comfortable.

Some days later laryngoscopical examination showed the larynx much more free, but also revealed the presence of considerable growths lower down, which had previously been concealed. Repeated cauterizations were made, but it became evident that entire removal or destruction of the growth through the natural passages was impossible.

8th August.—The face of the patient was cyanotic, and the obstruction to respiration very great. She could no longer lie down. Laryngoscopical examination showed the growth, "the mammillated mass corresponding to the two anterior thirds of the glottis, with an irregular opening behind."

11th.—Chloroform having been administered, the superficial structures were divided along the median line; and when all bleeding had ceased (a vein having been ligatured), the first ring of the trachea, the cricoid cartilage, and the crico-thyroid membrane were cut through at one incision from below upwards, and a large canula was introduced. Large polypoid masses were at once seen. A grooved director was then introduced, and the thyroid cartilage was divided by one stroke of the bistoury. Fresh, strawberry-like masses made a kind of hernial projection into this opening. The thyro-hyoid membrane and base of the epiglottis were then cut transversely by strong scissors.

The larynx was then cleared out by pulling away the growths piecemeal. Some of them (probably lodged in the ventricles) were still very large. Bleeding was arrested by a cold sponge. Wires were passed through the edges of the thyroid to facilitate their easy separation on subsequent days. The canula was left in position.

12th.—The larynx was again opened; more growths were removed by dressing forceps, and nitrate of silver was applied.

13th.—The larynx was reopened; its internal surface was clean but raw. Some points of the mucous membrane which showed a papillary appearance (degenerescence), but without pediculated tumours, were touched with acid nitrate of mercury. A similar treatment was repeated on a subsequent day.

24th.—The wound was closing rapidly, and respiration was free.

At the end of September the wound was closed throughout the greater part. About the middle a fistulous opening remained. Respiration was perfect. The voice was altogether extinct; but the patient could make herself understood easily, her condition being quite different to that of a person who, wearing a tracheotomy canula, has no voice at all. Small rosy projections, seen on laryngoscopic examination, were cauterized; and a slight perichondritis which existed over the right ala of the thyroid was treated by the application of tincture of iodine. A slight fistulous opening, leading to the spot where there had been suppuration about the cartilage, remained, but would only admit a fine probe, and no air passed through it.

26th October.—The patient left the hospital breathing freely, but aphonic. The wound was entirely healed.

Five or six weeks later she died. But no distinct history of her fatal malady could be obtained. "It is probable that this unfortunate woman succumbed to some intercurrent affection of the lungs which she contracted in the rude climate of her valley."

In this case removal through the natural passages was impossible, though repeatedly attempted. There is no reason

for supposing that the death of the patient was in any degree due to the operation, nor, indeed, to a recurrence of the disease in the larynx. She survived the operation more than three months.

CASE 20.—*Condylomatous Growths; Thyroid Cartilage and Thyro-hyoid Membrane divided; Growth removed with right Vocal Cord, &c. Result partially successful. Respiration free, but Voice much impaired.*

(‘Thèse de Swebel,’ Strasbourg, 1866; Planchon, op. cit., p. 64; Koeberlé, Strasbourg.)

A locksmith, æt. 57, came under observation in May, 1865. He had been aphonic for seven months and a half, and then suffered from embarrassment in breathing, and difficulty in swallowing. Syphilis denied. (“No syphilitic antecedents”)(?) Laryngoscopic examination (M. Aronssohn) showed œdema of the aryteno-epiglottidean folds, and ulceration of the free border of the left vocal cord. The right vocal cord had disappeared, and in its place was a considerable swelling of condylomatous aspect. The glottic orifice was irregular, deviated towards the left from behind forwards, and was contracted, the proper movements almost abolished. Spasmodic and suffocative difficulty of breathing continued to increase; asphyxia was imminent; and aphonia was complete.

In May, 1865, the larynx, &c., having been fully exposed along the median line, M. Koeberlé rapidly introduced one blade of a pair of scissors through the cricothyroid membrane, and cut upwards through the thyroid cartilage. The thyroid cartilage was completely ossified, nevertheless the section was easily made. The parts divided were forcibly separated, and the thyro-hyoid membrane was partially torn in the course of the longitudinal fibres. The growth (which was as large as a walnut) and occupied the whole extent of the right true vocal cord, was seized by dressing forceps and removed. The base of the growth was very large. In removing it the internal surface of the

thyroid cartilage was exposed. The left inferior vocal cord presented erosions in two places; around which were some small vegetations. The parts were kept open by means of silk passed through the edges of the thyroid cartilage, and steel wire in horseshoe shape. Next day acid nitrate of mercury was applied. A straight canula was introduced, projecting towards the laryngeal cavity.

The patient breathed perfectly through the natural passages. Small portions of the thyroid cartilage necrosed, and were discharged at the end of three weeks.

Seven months after the operation the patient still wore his canula, but it was kept always closed. He breathed freely, and though still partially aphonic, could make himself distinctly understood by speaking in a low voice.

It certainly would have been wonderful if the voice had been restored in such a case as this. Despite the history, it is probable that we ought to regard this as a syphilitic case.

CASE 21.—Papillomata; Tracheotomy; Thyrotomy; Growths removed. Result partially successful; Respiration free, but Voice not restored.

(‘Growths in the Larynx,’ by M. Mackenzie, M.D., op. cit., p. 166. Mackenzie and Evans, London.)

Caroline M—, æt. 12, was seen on the 9th July, 1868. She had been aphonic almost from birth, and at intervals had suffered from most severe attacks of dyspnœa. Laryngoscopic examination showed that the larynx was occupied by growths situated on both vocal cords. It appears the patient attended at the Hospital for Diseases of the Throat occasionally during several years. It was hoped that as she got older she would get more manageable, but the malady became worse more rapidly than her temper improved.

On the 15th July tracheotomy, and then thyrotomy, was performed by Mr. G. Evans, and two warty growths, each

about the size of a raspberry, were removed. They occupied the entire length of each cord. The operation was conducted in the same manner as in a former case (see p. 54). Chloroform, however, was administered.

A good recovery followed. The patient "has never since suffered from dyspnœa; but her voice continues to be entirely suppressed. The larynx has been examined several times during the last two years." There is no recurrence of the growth, nor congestion of the mucous membrane. "The aphonia appears to be due to diminished tension of the vocal cords, which, however, approximate perfectly."

CASE 22.—Growth probably of syphilitic origin; Thyroid and Cricoid Cartilages and upper rings of the Trachea divided; Growth removed; Cauterization; Canula introduced, and continuously worn; Great benefit; Voice strong, but hoarse. Result partially successful (Case probably not complete).

(‘Thèse de Swebel,’ Strasbourg, 1866; Planchon, op. cit., p. 70.
Busch, Bonn ?.)

The patient was a man, æt. 43, who in 1853 had had syphilis, with all kinds of secondary affections. In July, 1862, he had suffered from inflammation of the kidneys, which recurred the next year. Syphilitic laryngitis came on, and he had attacks of suffocation, and hoarse and noisy cough. His voice was hoarse and almost completely lost. In the course of two months the syphilitic affections of the larynx disappeared under the influence of repeated cauterizations, etc.

6th May, 1863.—Laryngoscopic examination showed the larynx apparently normal; but during deep inspiration a fleshy mass could be seen below the glottis, its base being on the posterior wall of the trachea.

Suffocative attacks becoming again intense, on 24th June Busch opened the trachea, and prolonged the incision to the crico-thyroid membrane. On separating the edges of the

wound the growth was seen. Respiration became free. A canula was introduced. Starting from the wound already made, an incision was carried through the thyroid cartilage as far as the middle. The growth was removed in fragments, and the surface from which it grew was cauterized. The growth extended as far as the inferior vocal cords. The mucous membrane of the trachea remained swollen, but the passage of air was easy, even when the canula was removed. In order to obviate the contraction of the trachea, a canula with two arms was introduced—one short arm rising into the larynx up to below the vocal cords; the other longer, descending into the trachea.

The diameter of the canula was increased; the fleshy granulations were cauterized. The voice was strong enough, but hoarse on account of the slight swelling of the trachea. The general condition was very satisfactory.

Mackenzie, in his table, says of this case—"Persistent dysphonia; recurrence of growth; canula still worn:" and in his 'Appendix,' p. 233, "No benefit." He quotes from 'Beobachtungen zur innern Klinik,' Bonn, 1864.

CASE 23. Malignant Epithelioma; Thyroid and Cricoid Cartilages, &c., divided; Partial removal of the Growth. Some Relief. Repetition of the Operation; Death fifteen months after the first Operation.

('Transactions American Medical Association,' vol. vi, 1853, p. 510.
Gurdon Buck, M.D., New York.)

Madam L—, æt. 51, when seen on 14th August, 1850, had been suffering for a considerable period from hoarseness, which had gradually advanced to complete aphonia. The aphonia persisted for more than a year without dyspnœa. On April 21st, 1851, the patient was visited and found to be suffering from "obstruction of the larynx with great dyspnœa and complete loss of voice." Respiration sonorous and laboured; severe cough. On May 3rd the symptoms

were urgent; severe paroxysms of dyspnœa threatened suffocation.

First operation (3rd May, 1851).—An incision was made along median line four inches in length. The crico-thyroid membrane was incised, and the incision was extended upwards through the whole length of the thyroid cartilage (which was ossified, and was divided by scissors) and downwards through the cricoid and upper rings of trachea. The interior of larynx was found to be lined by growths, the largest of which attached by a broad base partly concealed the ventricle, and extended higher up upon the wall of the laryngeal cavity. Two or three small pendulous portions, and several portions of the tumour itself were snipped away. But the whole growth could not be removed. A trachea tube was inserted.

4th May.—Further portions of the growth were snipped away, and acid nitrate of mercury was applied. Gradual improvement ensued, and the patient could breathe through the larynx (the tube being closed), and make herself heard, speaking in a whispering voice. The wound healed except where the tube was retained.

Second operation (20th September).—A fresh incision was made extending through the parts previously divided, and also through the thyro-hyoid membrane. Further portions of the growth were removed, but its extent was found to be so formidable that it was obviously impossible to remove the whole. All that could be got at was seized by forceps, and pared off by a bistoury. The wound was closed throughout the greater part of its extent by sutures; and the tube was replaced. The wound speedily healed, but the growth extended and soon surrounded the tube in such way as to render its introduction (for changing) very difficult.

Third operation (January, 1852).—A fresh opening was made lower down in the neck for the tracheal tube.

In March a portion of one of the arytenoid cartilages was coughed up. Difficulty of swallowing became urgent, and the general condition very much impaired.

4th August.—The patient died suffocated, the tube

having been removed to be changed, and its reintroduction being difficult, or at any rate not accomplished in time.

Post-mortem examination showed that the growth had extended "over the orifice of the larynx down upon the anterior wall of the pharynx, as far as the lower edge of the cricoid cartilage, and presented a moderately elevated, flattened tumour, of a grayish colour and firm consistence, with well-defined edges. It appeared to be deposited in the submucous cellular tissue in small agglomerate lobules. The entire cavity of the larynx was invaded by gangrene which had destroyed the morbid growths formerly occupying it, and had exposed the cartilaginous walls in a state of necrosis. The arytenoid cartilages had disappeared, and a small portion only of the epiglottis remained. The circumference of the growth which had escaped gangrene presented a thickened callous everted margin resembling the edges of a scirrhus ulcer.

This doubtless was a case of epithelioma or some allied form of malignant disease.

It is worthy of note that the patient was more relieved by the operation than she would have been by a simple tracheotomy, inasmuch as she was enabled to speak better, and also to breathe to such an extent through her larynx as to allow her to take snuff up through her nostrils, which luxury she esteemed highly.

CASE 24.—Epithelioma : Tracheotomy ; Thyroid and Cricoid Cartilage, &c., divided ; Partial removal of the Growth. Temporary benefit ; Voice good for some months ; Death twelve months after the Operation from extension of the Growth.

('British Medical Journal,' 30th September, 1865. Sir D. Gibb, M.D., and C. Holthouse, London.)

A female, æt. 29, came under observation 16th March, 1864. During two years her voice had been hoarse or lost altogether. "The breathing had been obstructed during two months. Efforts at speaking caused pain." At night

there was cough. "The right wing of the thyroid cartilage had been swollen and decidedly prominent, and somewhat indurated and painful for five months. Laryngoscopic examination showed "a large furrowed and lobular growth with irregular outline, of an ashy gray colour, springing from the root of the epiglottis, extending to the right side of the larynx, involving the false cord and covering the whole of the true vocal cord, as well as the anterior part of the left true cord." "Phonation was tolerably fair, though hoarse."

On 29th March a small portion was removed by means of the wire *écraseur*. Some relief followed. Further attempts to remove more were unsuccessful.

12th April.—Dyspnœa being urgent tracheotomy was performed by Mr. Holthouse.

On the 20th April, chloroform having been administered, the original incision for tracheotomy was extended upwards by Mr. Holthouse, by means of a scalpel and scissors, through the cricoid cartilage, the crico-thyroid membrane and the thyroid cartilage. By the nail of the index finger introduced through the wound and curved scissors Sir D. Gibb removed the growth. It was soft, friable, and vascular in some parts, firm in others. The wound was closed by sutures.

Microscopical examination showed the tumour to be differently constituted in different parts. One part consisted of "thickened mucous membrane with sessile cauliflower growths." "Another of dense fibrous tissue with minute extravasations of blood; the third of soft friable matter. Structurally the first represents compound warts; the second nucleated fibre (fibro-plastic or muscular) tumours; and the third the transition of a simple epithelial into a cancerous epithelial growth." (Dr. Andrew Clark.)

No untoward result followed. Five days after the operation the patient was sitting up. On the fourteenth day she was comparatively well.

10th May.—Laryngoscopic examination showed "the larynx to be free from the presence of any growth. The

surface of the mucous membrane, however, was rough, and the right vocal cord was seen to be congested and irregular at its anterior third."

In June the swelling over the right wing of the thyroid inflamed and suppurated.

At the end of August there was some dysphagia, and there was pain running up either side of the neck. Laryngoscopic examination showed recurrence and spread of the growth. "The voice, heretofore distinct, was now a rough loud whisper." The symptoms gradually increased in severity; and the swelling became considerably greater, and the induration more marked and extensive.

By the 10th December she had entirely lost her voice and was reduced to writing to express her wishes. Subsequently some degree of improvement took place, and then again an increase of all the unfavorable conditions. Bronchitis occurred towards the end of January, 1865. Towards the last not only was the larynx completely blocked up by the recurrence of the disease, but the pharynx at its lower part became affected to such an extent as to produce almost complete obliteration of the passage, and a few drops of water were only got down with great difficulty.

Death occurred on the 7th April, 1865, just a twelve-month after the operation.

The canula in this case was retained throughout.

CASE 25.—*Malignant Epithelioma; Tracheotomy; Thyrotomy; Growth partially removed; Canula persistently worn. Temporary benefit; Recurrence and spread of Growth; Death seven months after the Operation.*

('Growths in the Larynx,' by M. Mackenzie, M.D., London, 1871, p. 183. Mackenzie and Wordsworth, London.)

John S—, æt. 47, came under observation on 18th September, 1869. During the previous five years his breathing had been short. Four months previously he had been alarmed by violent attacks of suffocation coming on during the night. These attacks became more

frequent. A month later his voice became hoarse; also violent paroxysms of cough occurred. There was slight difficulty in swallowing. Laryngoscopic examination showed "a red cauliflower-like growth the size of a cherry projecting from the right vocal cord; the mucous membrane generally was congested and relaxed." Unsuccessful attempts were made to remove the growth through the mouth. On the third occasion a portion about as large as a pea was removed, but the patient suffered so much that he refused to submit to further treatment of this kind. Two days later the patient took cold, and the symptoms became urgent.

3rd October.—Tracheotomy was performed under chloroform by Mr. Wordsworth, and a canula was inserted.

17th October.—The patient did fairly well after the tracheotomy, and a fortnight later a vertical incision was made through the thyroid cartilage, and several large pieces of growth were removed from the larynx. The parts were brought together with silver sutures; the canula was retained.

The wound healed, but the patient continued to wear the canula.

"As the immediate result it may be stated that the dyspnoea entirely ceased, that swallowing was effected with ease, and the voice, though hoarse, became for a short time distinctly phonetic." Attacks of cough continued to occur. At the beginning of December granulations sprang up around the canula, and, spite of treatment, the vegetations increased and spread in all directions.

January, 1870.—Laryngoscopic examination showed some recurrence of the growth.

In the beginning of March the growth was seen to rise above the level of the aryteno-epiglottic folds, and to block up the entire larynx. Frequent attacks of suffocative cough occurred, and during one of these attacks the patient died, on 10th May, 1870.

Post-mortem examination showed "that the whole of the interior of the larynx was blocked up by an enormous

cauliflower excrescence, which extended from the level of the aryteno-epiglottic folds downwards for more than four inches, thus reaching quite an inch below "the tracheotomy opening. The growth also extended along the track of the canula to the outside of the neck, and formed a thick fringe an inch and a half wide round the tracheal opening.

"Microscopic examination illustrated the extreme difficulty of arriving at correct conclusions concerning the histology of these tumours." This growth was at first considered to be a "papilloma;" on another examination "fibro-cellular;" and still later some nested cells (laminated corpuscles) showed it might be "classed in the category of carcinomatous growths, and considered as epithelioma." This conclusion accords with the clinical history.

CASE 26.—*Papillary and Cellular Sarcomatous Growth; Tracheotomy; Thyroid and Cricoid Cartilages, &c., divided; Growth partially removed. Little or no benefit; Canula worn until Death, which occurred two years after the operation from gangrene of the lungs, &c.*

(*Archiv für Klinische Chirurgie. Langenbeck,* v, 228, and viii, 544; *St. Petersburg Medizin. Zeitschrift*, iii, 153, and vi, 43; *Planchon, op. cit.*, p. 66. *Rauchfuss, St. Petersburg.*)

In 1861 Ranchfuss opened the larynx of a woman with the view of removing an extensive papillary and cellular sarcomatous growth, which was producing very considerable obstruction.

Operation.—The larynx was divided along the middle line, both thyroid and cricoid cartilages being cut through, and the trachea also opened. The tumour was then removed and with it the right true vocal cord, but some portion of the growth was left. During the operation the trachea seemed to be contracted by an affection of the mucous membrane similar to that of the larynx. A tracheal canula was fastened in.

The laryngeal growths soon sprang up afresh. The

patient continued in good health, but continued to wear the canula. Three times in the course of ten months attacks of suffocation came on ; and during these attacks inspection through the tracheal opening, and sounding, gave rise to the impression that the lower part of the trachea was considerably contracted, owing to the swelling up of the mucous membrane. A strong solution of nitrate of silver was injected, and after the pain and distress first produced had subsided the symptoms were ameliorated. Soon after the operation portions of food occasionally escaped through the tracheal canula. The patient continued to wear the tube ; and the growths increased with rapidity and entirely closed the glottis (filled the larynx, &c.). At the end of two years she died of gangrene of the lung.

Post-mortem examination showed a perforation the size of a quill, extending diagonally downwards from the œsophagus into the middle of the trachea. A chicken bone was found in the right bronchus. This perforation was not caused by the tracheal canula. The mucous membrane of the trachea was beset with scar-like bands, between which there were appearances of diverticular extensions, although such did not actually exist.

This case, although unsuccessful so far as the desired result was concerned, shows how comparatively free from danger the operation itself is even when carried so far as to involve the removal of the vocal cord. No particulars respecting the voice are given in Langenbeck's account ; it was presumably entirely lost.

CASE 27. — *Papillary Growths ; Tracheotomy ; Larynx opened in Median line ; Growth removed. Result negative ; Case incomplete.*

(‘ New York Medical Journal,’ May, 1865, quoted from St. Luke's Hospital Records (in Dr. Sand's paper). G. Buck, New York.)

The patient, a man, æt. 25, was first seen in 1861.

Tracheotomy was performed on the 26th November, 1861, for supposed abscess of the larynx.

13th April, 1862.—The larynx was opened by median incision, and a small growth removed, which appeared to be a mass of exuberant granulations that had formed above the opening made for the canula.

The patient recovered (it appears) from the major operation, but was still obliged to wear the canula; and laryngoscopic examination showed marked narrowing of the rima glottidis, as if from previous ulceration.

This case is altogether incomplete and unsatisfactory. It is somewhat curious that Dr. Gordon Buck makes no allusion to it in either of his published papers relative to this operation.

CASE 28.—*Papillomata (probably congenital); Tracheotomy; Thyroid and Cricoid Cartilages, &c., divided; Growths removed; Canula persistently worn. Result negative; Growth successfully removed, but neither Normal Respiration, nor Voice regained.*

(‘Surgical Treatment of Children’s Diseases,’ T. Holmes, 2nd edition. London, 1869, p. 311. T. Holmes, London.)

A girl, æt. 9, was admitted into St. George’s Hospital 28th January, 1867. She had been long under Mr. Holmes’s care for aphonia. Paroxysmal dyspnœa had lately come on, and threatened life. A laryngoscopic view could not be obtained though the child was very docile. All kinds of local treatment were tried.

28th January, 1867.—“The child was brought to the hospital, having been very nearly dead during the previous night; but when seen the breathing was quite quiet, and the lips of natural colour.” In the evening paroxysms of dyspnœa came on, and tracheotomy was performed just above the thyroid isthmus.

6th February, 1867.—On making the preliminary incision, the parts over the larynx were found to be peculiarly

vascular, but the bleeding was pretty well staunched before the larynx was opened. The larynx being fixed by hooks, "a probe-pointed straight bistoury was passed into the slit of the trachea tube, and the incision was carried completely through the thyroid cartilage." "The bleeding that followed was very considerable." The parts were held asunder by hooks, and when the child had partially recovered, and all blood had been wiped away or ejected, chloroform was readministered.

A pendulous growth, projecting into the right ventricle, was seen, about the size and shape of a pea; soft, and springing apparently from over the false vocal cord. The growth was seized and cut off. A remaining portion was removed close to the cord. There was no other distinct growth, "but the whole mucous membrane looked rough and granular." The wound was closed by sutures, and the tube readjusted.

The general progress appears to have been on the whole favorable, but "no power of natural breathing was recovered during about three months passed in the hospital." The tube was experimentally removed for a day or two, but it was found necessary to reintroduce it. Finally, she left the hospital in good health, but still wearing the tube.

At any rate the operation did no harm.

CASE 29.—*Epitheliomata (Benign ?), Cicatricial Band uniting the Vocal cords ; Other new Growths ; Tracheotomy ; Thyroid divided ; Further proceedings abandoned, it being impossible to remove the Growths ; Canula persistently worn. Result negative.*

('Berlin Klinische Wochenschrift,' 7th December, 1868, p. 501.
Navratil, Pesth.)

M. D—, a maidservant, æt. 20, was under observation during 1867-8. The early history of the case is not given. It would appear, however, that laryngotomy had been performed some time previously, for the removal of epithelio-

matous growths from the larynx, and that as the result of such operation a cicatricial band was formed stretching across between the vocal cords, adhering to each, and obstructing the passage of air. This bridge-like membrane was repeatedly divided by the knife, and this method proving inefficacious, resort was had to the galvanic cautery, and after two sittings the membrane appeared to be completely destroyed. An inflammatory swelling next appeared unexpectedly in the middle of the larynx; and suffocation impending, tracheotomy was performed. The œdematous portion of the swelling subsided, and in its place an extensive whitish new formation appeared, which proved to be of firm consistency. The galvanic cautery (porcelain) was applied; but only partial destruction of the growth was effected.

After a time Navratil having observed on experimental removal of the canula that a portion of the new growth hung down into the trachea, resolved to open again the larynx, and to remove the whole substance. The situation of the operation (the cicatrix of the incision previously made?) presented a very unsatisfactory appearance. A firm fibrous irregular scar occupied the place of the subcutaneous tissue, and the cartilage was thickened and spongy in texture, bleeding freely; it was ossified in some parts. When the divided halves of the thyroid cartilage were separated, the portions which hung down were easily cut off. The patient was nearly suffocated. Some considerable bleeding took place from a wounded vein; but the tracheal canula was replaced, and the patient gradually recovered, and the bleeding was arrested. It now, however, became manifest that the new growth so intimately involved the whole larynx, that extirpation was impossible unless the vocal cords and arytenoid cartilages were also removed. The wound was therefore closed, and local antiphlogistics applied. In the course of a few days the wound healed by primary union. The patient was sent home wearing the tracheotomy canula, with which she probably will not be able to dispense.

This case is altogether unsatisfactory. The information

given as to the early conditions and treatment is by no means definite. It would appear, however, that much mischief was done by the attempts made through the natural passages, and that no harm resulted from the abortive attempt to afford relief by opening the larynx and then removing the growth.

CASE 30.—*Papillomata (probably congenital) ; Tracheotomy ; Larynx opened, growths removed ; Recurrence ; Repetition of the operation. Final result not ascertained ; Probable cure ; Case incomplete.*

(Dr. L. Voss by private letter submitted to the Society, and by verbal communication to Arthur E. Durham. Dr. L. Voss, New York.)

A boy, æt. 3½, came under observation in 1866, suffering from an affection which was probably congenital, "the boy's voice from his birth never having been right." Laryngoscopic examination by Dr. Simrock showed warty growths in the larynx.

Nov., 1866.—Chloroform having been administered the trachea was opened and a canula introduced. Then the larynx was slit open from the wound upwards, and the growths were removed with scissors and knife. They filled the cavity of the larynx.

The child apparently did well (so I was informed by Dr. Voss), and the wound healed. But the disease returned, and in April, 1867, the operation was repeated. After the cutting instruments had been used for the extirpation of the growths, chromic acid was applied.

7th May.—The wound had nearly healed, and, as Dr. Voss informed me, the patient could breathe perfectly well through the natural passages. He, Dr. Voss, considered the case in every way successful. But, of course, in the absence of further information of precise character it must be considered complete.

CASE 31.—*Fibrous Growth (?) ; Thyroid Cartilage and Thyro-hyoid Membrane divided ; Tumour removed ; Tracheotomy. Death from Pyæmia seven days after the Operation.*

(‘Gazette Hebdomadaire,’ 20th Mai, 1864, p. 347 ; ‘Thèse de Swebel, Strasbourg,’ 1866 ; Planchon, op. cit., p. 54. Debrou, Orleans.)

A man, æt. 52, who came under observation in 1864, had been suffering during six months from increased difficulty in speaking, and swallowing, and even in walking quickly. A rounded tumour as large as a walnut could be seen in the throat. It could be seized with forceps, but the point of attachment could not be determined. The cavity of the larynx was hidden by the tumour.

Operation.—A transverse incision through the thyro-hyoid membrane was first made—this not being sufficient—the thyroid cartilage was incised in the middle line. The tumour was brought into view, and removed by the écraseur without any troublesome bleeding. M. Debrou fearing suffocation from possible swelling of the parts, performed tracheotomy, cutting through the three first rings of the trachea without touching the cricoid.

The patient died seven days after the operation. Post-mortem examination showed small abscesses in the bases of the lungs. There was no inflammatory swelling in the larynx.

M. Debrou, probably with reason, attributed the fatal result, not to the operation itself, but to the tracheotomy and the presence of the canula, which, after all, was proved to have been unnecessary.

CASE 32.—*Extensive Carcinomatous Disease ; Thyroid and Cricoid ossified, and divided with difficulty ; Operation abandoned. Death eleven days after from Blood-poisoning,—Erysipelas, Gangrene (Broncho-pneumonia).*

(‘Medizinische Jahrbücher Wien,’ 1869, band xvii, 2nd heft (?), p. 81. Schroetter, Vienna ; Virchow’s ‘Jahresbericht,’ Berlin, band ii, 1870.

W. B—, an inn-keeper, æt. 63, was first seen 29th

December, 1868. A year and a half previously the patient had become hoarse, and in the course of the last two months had begun to suffer from increasing dyspnœa. At length suffocation seemed imminent. Laryngoscopic examination showed that the interior of the larynx was occupied by a morbid growth red in colour and somewhat glandular in appearance. A small triangular gap represented the chink of the glottis. The appearance of the growth and the rapidity of its increase put the diagnosis beyond doubt, although there were no enlarged glands, nor other signs of cachexia. It was pronounced (and ultimately proved) to be epithelial-carcinoma, and the patient was recommended to come into the hospital.

On the 9th January, 1869, an attempt was made to remove the growth, the trachea having been opened and a canula introduced as a preliminary. Great difficulty was experienced in dividing the thyroid cartilage on account of its ossified condition; and when the parts were cut through there was again great difficulty in separating them so as to expose the cavity of the larynx. The growth was found to be so extensive, and so intimately connected with the various structures, that it would have been impossible to remove it without removing the larynx itself (or, at any rate, the greater part of it). The operation was consequently abandoned.

The day after the operation erysipelatous inflammation showed itself about the wound, and gradually spread down the right side of the neck and the right arm. Soon afterwards the parts about the wound became gangrenous, and the patient sank into a state of debility and fever from which he never rallied. He died eleven days after the operation.

Post-mortem examination.—The thyroid and cricoid cartilages were found denuded of perichondrium to the extent of some lines from where they had been cut through. The surrounding parts were sloughy. The growth in the larynx occupied the left half for a space of an inch and a half, and on the right, extended from the vocal cord as far as the first ring of the trachea. There was general broncho-pneumonia

of both lungs. The subcutaneous tissue about the right elbow was infiltrated with matter.

In this case the issue must have been hopeless from the first, and it would probably have been better if the operator had been content to perform a simple tracheotomy. The result, however, so far as the general merits of the operation are concerned, can only be regarded as negative.

It is to this case that Mackenzie gives the reference as that in which he states death to have occurred seven hours after the operation from hæmorrhage.