of eleven months, I reported to the weekly board the unsatisfactory conclusion of the experiments we had made. During that period, I am certain that the remedy was fairly tried on a small number of patients. If it had been more fully tried, I might, perhaps, have formed a higher estimate of the influence of galvanism in the cure of disease. But in twenty-three of the recorded cases, there was only one slight case, in which the improvement from the treatment was rapid; and only three others, in which I was satisfied that benefit was slowly derived from it. These three were all cases of paralysis from lead.

ON LARYNGOTOMY, AND TRACHEOTOMY, IN ACUTE AFFECTIONS OF THE LARYNX.

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In Acute Affections of the Larynx, the surgeon is sometimes suddenly called upon to make an opening into some part of the air-passages, in order to relieve the urgent dyspnœa which has supervened.

Laying aside all considerations about the medical treatment of these cases, my intention is to examine solely the merits of the two operations, Laryngotomy and Tracheotomy, by which it is usually sought to afford this relief.

Of the two operations, that in the trachea is the one selected by most surgeons of the present day. In the following observations, however, I shall endeavour to prove that, not only is this preference not founded on just grounds, but that it would be advisable, in such cases, to make the opening in the crico-thyroid region.

Acute affections of the larynx, terminating in effusion, present, it is well known, a very great difference in the adult and in the child; the effusion, in the former, taking place by far most frequently in the sub-mucous tissue; whereas, in the latter, it is usually poured out on the free surface of the mucous membrane. In these cases, in the adult, the effusion is purely laryngeal; in the child, it is, most frequently, not only laryngeal, but also tracheal.

This marked difference in the localities of the effusion, at these two periods of life, at once points out two great divisions, in which the surgical treatment will necessarily be very different. My intention is to confine, for the present, these remarks to one of the divisions only, that of the adult period.

Effusions in the sub-mucous tissue of the larynx, it matters not of what kind, or how produced, are strictly limited to the parts above the rima glottidis. This fact, already pointed out by several pathologists, has not, I think, been sufficiently dwelt upon by practical surgeons.

That the effusion is thus invariably limited to this region, may be proved by morbid anatomy, by experiments, and by the anatomical structure of the parts. In the following cases, especial notice was paid to the limits of the disease, at the post-mortem examinations, some of which were made several years ago.

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A man, æt. 50, was attacked with diffuse cellular inflammation of the scalp, after an injury of the head. The inflammation subsequently spread to the head and neck; urgent dyspnœa suddenly supervened, and he died. A quantity of yellow-coloured serum and lymph was found in the cellular tissue of the neck, and both aryteno-epiglottic ligaments were much thickened by effusion of serum in their sub-mucous tissue. The disease had not spread beyond this part of the larynx.

A woman, æt. 39, suffering from a violent attack of sore throat, was suddenly seized, in the night, with urgent dyspnœa, and died. Besides the marks of inflammation about the throat, the sub-mucous cellular tissue of the epiglottis, aryteno-epiglottic ligaments, and ventricles of the larynx, was much inflamed, and infiltrated with a large quantity of recently effused lymph. The mucous membrane itself was inflamed, and several small ulcerations were found in the region of the aryteno-epiglottic ligaments. The mucous membrane of the trachea was much increased in vascularity; but the effusion of lymph was strictly limited to the parts above the inferior chordæ vocales.

A man, æt. 65, died with symptoms of suffocation, having been affected with diffuse inflammation of the head and neck, following an injury of the head. The laryngeal mucous membrane of the epiglottis was of a brilliant scarlet colour; increased vascularity also existed about the mucous membrane of the larynx itself, and there was slight œdema of the aryteno-epiglottic ligaments. The mucous membrane of the trachea was, throughout, of its natural colour and thickness.

A man, æt. 45, died of extensive inflammation of the cellular tissue about the neck. The epiglottis and aryteno-epiglottic ligaments were very much thickened, by an effusion of lymph and pus in their sub-mucous tissue: this effusion extended as low as the upper margins of the inferior vocal chords, and there it suddenly ceased. The parts below this point were quite healthy.

A man, æt. 53, admitted into the hospital with a scalp wound, subsequently died of diffuse inflammation of the head and neck. The sub-mucous tissue of the left aryteno-epiglottic ligament, was much thickened by infiltration of serum. All the other parts of the air passages were quite healthy, with the exception of some slight vascularity of the mucous membrane.

In a man, æt. 55, who died of diffuse cellular inflammation of the neck, a large quantity of lymph was found in the sub-mucous tissue of the left aryteno-epiglottic ligament, and left superior chorda vocalis; but there was no diseased appearance on the opposite side. The sacculi of the larynx were quite healthy, and the mucous membrane of the trachea presented only a slight increase of vascularity.

A woman, æt. 27, admitted into the hospital with nodes on the forehead, was suddenly attacked with violent sore throat; the inflammation spread rapidly to the neighbouring parts; urgent dyspnœa made its appearance, and she died. The mucous membrane of the soft palate and back part of the tongue was of a very dark colour, with extensive effusion of lymph in the sub-mucous tissue; these appearances were also very much marked in the glosso-epiglottic and aryteno-epiglottic ligaments. The mucous membrane of the trachea was increased

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in vascularity, and its surface was covered with a thick tenacious mucus; but the membrane itself was not thickened, the effusion of lymph ceasing abruptly at the inferior vocal chords.

A man, æt. 28, was attacked with sore throat; erysipelas of the head and neck subsequently appeared, urgent dyspnœa supervened, and he died. The cellular tissue at the root of the tongue, that of the epiglottis, aryteno-epiglottic ligaments, and of all the parts above the inferior chordæ vocales, was extensively infiltrated with lymph and pus. The aperture of the glottis was all but blocked up by the thickened vocal chord. The mucous membrane of the larynx was in a sloughy state; that of the trachea was much increased in vascularity, but not in the least thickened.

A man, æt. 45, was attacked with sore throat; the inflammation spread to the neighbouring parts; violent paroxysms of dyspnœa supervened suddenly, and during one of these laryngotomy was performed, but he died thirty-six hours after the operation. The sub-mucous tissue at the root of the tongue, and of the glosso-epiglottic ligaments, was much thickened by a large quantity of recently effused lymph: the epiglottis and aryteno-epiglottic ligaments were also much thickened by a similar effusion. The cellular tissue of the larynx was thickened, and infiltrated with serum only. This thickening ceased abruptly at the margins of the inferior chordæ vocales, the parts below being simply congested and covered with mucus.

A man, æt. 31, who was in the hospital for enlarged cervical glands, was attacked with erysipelas of the head and neck; the tonsils became enlarged, urgent dyspnœa suddenly made its appearance, and he died. The sub-mucous laryngeal tissue of all the parts above the inferior vocal chords, was extensively thickened and œdematous; and the disease was strictly limited to these parts, the mucous membrane of the trachea being healthy.

The appearances above related were the same in several other post-mortem examinations, the details of which I think it quite unnecessary to give here. In all of them, whatever may have been the state of thickening above the inferior vocal chords, these chords themselves presented their well defined, sharp margins, and, in many instances, their glistening appearance, the mucous membrane covering them not being in the slightest degree affected. In none of the cases, was the mucous membrane of the trachea thickened.

That such are the precise limits of the effusion, in most cases of acute affections of the larynx at the adult age, can also be proved by some very simple experiments. If a larynx and trachea be removed and kept in water for some little time, the cellular tissue of all the parts above the inferior chords will become œdematous and swollen, whereas, the parts below these chords will retain their usual appearance, the chords themselves presenting, in all cases, their well known glistening appearance. So, too, if either water or air be injected into the cellular tissue of the larynx, it will be found not to pass beyond the upper margins of the inferior chords; further than this spot, it cannot be forced downwards.

The explanation of this limitation is easily found in the anatomical structure of the larynx and trachea. Above the inferior vocal chords, the mucous membrane is connected to the subjacent parts by means of

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a loose cellular tissue, which is very abundant, especially in the region of the aryteno-epiglottic ligaments, whereas the connections of the mucous membrane lining these chords, and the trachea, are very firm; the cellular tissue here, being very short and very dense, forms so firm a bond of union, that it is difficult to separate the mucous membrane from the parts lying below it.

The late Mr. Liston, who was a staunch advocate for the operation of tracheotomy in most affections of the larynx, where an operation was required, admitted, in some observations published in the *Lancet* of 1844, "that the high operation in the crico-thyroid membrane, laryngotomy in fact, might answer in cases where there is obstruction in the rima glottidis, as where swelling has followed a scald of the glottis." The admission thus made by Mr. Liston for these cases of accident, ought to be applied to most cases of acute laryngeal affections in the adult. After childhood, it is, comparatively speaking, very rare to find the obstruction any where but at the rima, or immediately above this region; it matters not whether the effusion has been preceded by an accident or not, its locality is precisely the same in both instances; it is limited in the one, as well as in the other, to the parts above the rima.

Although the effusion be above the rima, in practice it will be found, in most instances, that the obstruction for which the surgeon is called upon to operate is at the rima itself. The sudden and urgent dyspnœa, coming on in paroxysms, at once shows that this obstruction is caused by spasms of the muscles in this region. This too is proved by post-mortem examinations; for in many cases, where patients have died of sudden suffocation, the effusion has been so slight as to present little or no obstruction: certainly not sufficient to account for the symptoms. It is this spasmodic state which renders the operation of laryngotomy of so much value: coming on, as it does, so suddenly and violently, it demands that the relief be immediate: the opening in the air passages must, in many instances, to be of any avail, be made, as it were, instantaneously: tracheotomy, it is well known, cannot thus be performed with safety to the patient. A striking instance of this nature came under my notice some years back. A young woman, who was affected with extensive syphilitic ulceration of the throat, was suddenly one night attacked, no premonitory symptoms having been present, with most urgent dyspnœa; it was determined by the surgeon, who was close at hand, to perform tracheotomy; the operation was well done, but some little time was lost in making the opening in the wind-pipe, in consequence of some venous hæmorrhage, and the patient, who made a slight rally after the introduction of the canula, soon died. At the post-mortem examination, the larynx was found to be quite healthy; the urgent dyspnœa had been caused solely by spasm of the glottis, induced by the irritation which was going on in its immediate neighbourhood.

Many surgeons object, I know, to this operation of laryngotomy in acute diseases about this organ; they think it desirable that the opening should be made as far as possible from the seat of the inflammation, for fear of the canula becoming the cause of extension of the disease down the trachea. Such an objection it has, however, been shown, in the preceding observations, is not a valid one, inasmuch as

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the effusion in these cases does not extend beyond the loose cellular tissue of the larynx. Supposing the canula to excite some inflammation, the mucous membrane would be very slightly thickened, and an effusion of lymph might take place on its free surface; but this might be caused if the canula were placed in the trachea, just as readily as when the opening is made in the larynx. A canula placed in the larynx is not, however, likely to cause inflammation of any consequence there. This point I have particularly noticed in several post-mortem examinations. In a larynx in which a canula had been kept in the crico-thyroid region for thirty-six hours before death, there were no traces whatsoever of inflammatory action in this spot, notwithstanding that there was an abundant effusion of sero-purulent fluid above the inferior vocal chords. In another larynx, where the canula had been kept in the same region for forty-eight hours, and under similar circumstances, there were no traces of inflammation produced by the presence of the tube; neither was there any inflammatory action produced by the canula in a third case, in which it had been kept in the crico-thyroid region for several days; the mucous membrane, with the exception of the margins of the wound, not being even discoloured.

In the preceding observations, reference has been made to laryngotomy in the adult only; but there is a class of cases occurring,—and that not unfrequently, among children,—in which this operation is equally valuable. I refer to those cases where the little patients have swallowed either acids, or, more commonly, boiling water. Here the limits of the disease are just as well defined: the effusion following the accident, being in the sub-mucous cellular tissue, is strictly limited to the parts above the inferior chordæ vocales, and morbid anatomy shows precisely the same state of things as that which occurs most frequently in the adult; the urgent dyspnœa is in the same manner produced, in a great measure, by spasm of the glottis. In this class of cases, it may, I think, be said that laryngotomy is even more valuable than it is in the adult, owing to the much greater difficulty which naturally exists, in laying open the wind-pipe of a child.

Having thus pointed out the exact nature of the disease in these affections of the larynx, if we now proceed to weigh the respective merits of the two operations which may be resorted to, we shall find that either of them will serve for the relief of the urgent and distressing symptoms which sometimes accompany these cases. On the one hand, however, we shall have an operation, laryngotomy, which may, in most instances, be performed with great ease, and, as it were, instantaneously; and, on the other, tracheotomy, an operation, the difficulties and dangers of which are such, that all experienced operators and practical writers have thought it advisable to dwell upon them strongly,—so strongly, indeed, that it will be quite unnecessary for me to recapitulate them.

Such being the case, I shall close these observations with the two following general rules:

In adults, laryngotomy is, in cases of acute affections of the larynx, to be preferred to tracheotomy.

In children, laryngotomy is also to be preferred in cases where the obstruction has come on after swallowing boiling water, acids, or any other irritating fluid.

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