which it may be supposed to possess must be determined by the future history of the patient.

The operation of removing the arm at the shoulder-joint was first performed by the elder Morand, and afterwards by Le Dran, who describes very particularly the manner in which he operated. Various modes have since been suggested and practised. That by a flap of the deltoid is, perhaps, the favourite and the easiest. It has, however, always appeared to me, when I have witnessed this mode on the living and in rehearsing it on the dead subject, that the axillary flap was too thin, irregular, and not a good companion for its fellow; so that I determined upon the following, which gives a most complete line of union, and accurate adjustment of equal-sized flaps, with the smallest amount of wound.

The patient recumbent, and fully under the influence of chloroform, Mr. Gay commanded the subclavian artery. A short, stout-bladed amputating knife was thrust into the joint immediately below the acromion, and carried down the humerus in a straight line (dividing the deltoid into two equal halves) until it reached a point even with the posterior fold of the axilla, into which it was carried, and a posterior flap thus marked out raised. An anterior flap was formed in like manner by an incision starting immediately within the front axillary fold, and falling into the base of the first. The knife was then passed horizontally into the joint, separating the biceps tendon and other connexions with the head of the humerus. Mr. Adams, who held the limb, then thrusting the head of the bone outwards, the amputation was completed by division of the vessels and nerves and other soft parts constituting the floor of the axilla, Mr. Allingham securing the artery in a grip by closely following the knife with his fingers as it completed the separation. The axillary, circumflex, and other muscular arteries were then secured, and the flaps approximated.

Weymouth-street, June, 1866.

ON APHONIA: WITH ILLUSTRATIVE CASES.

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APHONIA, or want of voice, is, strictly speaking, only a symptom of disease of the larynx, but it is at once so remarkable and important that its elevation to the rank of a disease, *per se*, can hardly be objected to. Indeed, in the present state of pathology, the naming of a disease by the chief complaint of the patient is often both convenient and philosophical, for it is in general sufficiently distinctive as a name, and it saves us from becoming entangled prematurely with any theory as to the cause or nature of the morbid state.

It is, however, more open to question whether there ought to be a division of aphonic cases into the functional and organic, such as is generally made by writers of the present day. Voice is one of the functions of the glottis, and upon that organ alone it depends for its production. So long, therefore, as the glottis is in a normal state, the voice will be normal; but whenever it is in an abnormal state, the voice must likewise be abnormal—or, in other words, a normal voice is a result of organic health of the glottis; while an abnormal voice, and, *à fortiori*, loss of it altogether, is the result of organic disease of the glottis.

Nevertheless, it must be admitted that the alteration of structure in the organ is, here as elsewhere, often difficult of demonstration—nay, at times perhaps imperceptible to our senses; yet, even then, it is, for the reasons just given, quite as real as if it were palpable, and need be as little doubted by anyone as that the motor nerves are affected in cases of palsy, or the sensory nerves in those of anæsthesia, although in many of them the lesion escapes detection. I am sure that no one will demur to the general remark, that, as scientific observations are multiplied, the class of diseases arising from undemonstrable—which is just another word for undiscovered—causes will diminish, and that the number of those acknowledged to be due to palpably organic lesions will be proportionally increased.

Physiology teaches us that there are two motions of the glottis, which always accompany, and seem to be essential to, vocalization. These are—

1st. The rolling inwards of the anterior angles of the arytenoid cartilages, chiefly by the action of the lateral crico-arytenoid muscles, so as to bring the vocal cords or lips of the glottis into a state of parallelism and of close approximation. This motion is easily and beautifully seen by means of the laryngoscope, and the position into which it brings the valves of the glottis is thereby also seen to be maintained during the whole period of vocalization.

2nd. The other motion of the glottis in order to the production of the voice is the vibration of its margins. This cannot be seen in the laryngeal mirror, but it may be inferred from what is seen there; for when the air is forced through between the closed lips of the glottis during vocalization there is no wide opening of the rima perceptible, as in ordinary respiration, to permit it to escape, but it can only do so by partial upliftings of the margins of the valves—in fact, by producing an undulatory or vibratory motion in them. Hence the sound heard at such a time through the stethoscope placed over the thyroid is of a distinctly vibratory character; and the results of many experiments with excised and artificial larynges, as well as with membranous reeds, go to corroborate the same conclusion.

Now, if it be granted that the coincident occurrence of these two motions of the glottis—namely, the approximation of its lips, and their vibration in the air passing through between them—is essential to the production of the voice, then we come to recognise the practical fact that whatever causes the cessation of one or other of these motions must cause aphonia; and we are led to hope that, in studying cases of it in this light, we may expect to learn the means best fitted for its treatment and cure.

In making a few remarks upon this subject I shall divide cases of aphonia—and I believe the division is quite exhaustive—into two classes, according as the disease is caused by want of motor power, or by want of flexibility, in the glottis.

I. The motor power of the glottis may be diminished by one of two causes—namely, by a morbid state of the laryngeal nerves, or by degeneration of the glottidean muscles; for we may have a local paralysis affecting this organ through its nerves, or we may have it rendered powerless from destruction of its muscular fibres. If I were to estimate the comparative frequency of these two sets of cases from my own experience of them, I should say that the latter was the more numerous; yet it must be remembered that in all cases of palsy the nutrition of the muscles is invariably diminished, so that the two causes of want of motor power in the glottis, as well as elsewhere, become eventually combined into one. Hence at last it is impossible, on the most careful post-mortem inspection, to unravel these two types of the disease, and the only clue we have in attempting to do so is the often doubtful evidence afforded by the early history of the cases.

(1) The presumption of a local paralysis being the prime cause of the aphonia is strongest when the affection is sudden and complete at once, without previous disease of the organ. Thus there is a somewhat numerous class of cases in which the patient, after exposure to the ordinary causes of cold, does not become hoarse or suffer pain in the windpipe, but simply loses the power of vocalization.

During this spring I have seen two such cases, and carefully examined one of them with the laryngoscope. The glottis seemed to be perfectly natural, except that it did not move with sufficient vigour to close the rima, or to make an audible vibration in the air of an expiration. I applied galvanism directly to it every day for two or three days, by which time the voice was restored; while in the other case, in which local treatment was not used, the aphonia continued for a much longer period.

Again, in hysterical cases, the same morbid cause may be at work in the aphonia which so often characterizes them; but it is difficult to assign these cases to their proper class in our division, because we really find in such patients that the nutrition of the muscles fails as remarkably as the nervous energy, especially in those chronic cases of aphonia which may be traced to a hysterical state that has apparently long ceased to exist. I believe that, though originally due to a nervous affection, the mal-nutrition of the muscles is ultimately the chief cause of powerlessness in the glottis; and, in proof of this statement, I need only remind the reader of the state of enfeeblement in which the general muscular system of these patients is invariably found. It is well known that the treatment of all such cases is attended with very variable results. Measures that seem to have been rapidly successful in one case fail altogether in others; and even after an apparent cure has been accomplished, the most discouraging relapses are

liable to occur. I have nothing very definite therefore to remark on this subject, except that, from my experience of the direct application of galvanism to the glottis, I believe it to be the best local application in these cases; for the glottidean muscles respond to that stimulus even after they have ceased to be affected by the nervous force. I have elsewhere ("Topical Medication of Larynx," pp. 80, 92, &c.) related cases of nervous palsy of the glottis, apparently arising from violent efforts of the voice. These are of rare occurrence, but do not call for further remark.

In conclusion, on the nervous affections of the glottis, I cannot help expressing the thought which has often arisen in my mind—viz., that, remembering the frequency of hysterical palsy of the glottis, as well as the great and immediate influence of emotion upon its actions, it seems wonderful that, in cases of serious centrifugal palsy of the body, the power of vocalization is so seldom affected. In such cases the patient may be unable to articulate a single word distinctly, or he may have all the remarkable symptoms of aphasia, yet he almost never loses his voice.

(2) Degeneration of the internal muscles of the larynx, independently of any affection of the nerves, is another and a frequent cause of want of motor power in the glottis, and therefore a not uncommon cause of aphonia in the uncomplicated cases of that disease. A few years ago I had an opportunity of carefully dissecting a glottis in the state referred to, and I shall describe the morbid appearances which presented themselves.

The patient was the subject of Case 19, given in my book on the "Topical Medication of the Larynx," p. 90, where the early part of his history may be found. At one time I had restored the voice to sufficient power, though it remained hoarse and harsh, and I heard nothing of the patient for some years, when he came again to me with aphonia as complete as before. He then told me, in a faint whisper, that his voice continued strong till he had an attack of fever, in recovering from which he caught cold, and lost his voice once more. He now likewise had a bad cough, with purulent expectoration, and all the other symptoms of laryngeal phthisis. His strength rapidly gave way, in consequence of irritability of stomach and diarrhoea, of which finally he died about a month afterwards.

On inspection of the larynx, I found numerous small abscesses in the aryteno-epiglottidean folds opening upon the glottis. The mucous membrane of the epiglottis and glottis was red and granular, but not ulcerated; and the glottidean muscles were pale and atrophied, their fibres being interspersed with exudation-matter, partly degenerated into pus. There were, likewise, tubercular deposits in the lungs, but not advanced to the stage of softening.

The aphonia may, therefore, in this case, be pretty clearly traced to inflammation of the whole thickness of the glottis, resulting in exudation amongst the muscular fibres, and their consequent degeneration. The discharge of the abscesses above the glottis account for the cough and expectoration, as well as for the granular state of the mucous membrane in the vicinity of their openings.

In Cruveilhier's "Anatomie Pathologique" (liv. 39, pl. 5, fig. 2 and 2'), is another case, in which all the internal muscles on the right side of the larynx were completely atrophied and in a state of fatty degeneration. Cruveilhier did not know the previous history of this case; but I have no doubt that aphonia would be its chief characteristic.

Atrophy or fatty degeneration of the glottidean muscles, as the immediate result of chronic inflammation, is, therefore, a well-ascertained fact in pathology; and its connexion with palsy of the glottis and aphonia is abundantly clear from the case above given, as well as from the physiology of the larynx. To illustrate this connexion still further, and also to bring out some other points, I now relate the chief features of a case which has quite lately occurred to me.

It is that of a young lady, who dates the commencement of her illness as far back as 1859, when she caught cold, and had great hoarseness, cough, and expectoration, which was sometimes bloody. These symptoms continued with only temporary remissions, notwithstanding much treatment by various physicians, till the spring of 1862, when she had severe spasms of the glottis, and some kind of fit, apparently of a hysterical nature, and her voice entirely gave way. She was never afterwards able to speak above a faint and husky whisper. The fits, however, did not recur oftener than a few times. Change of air and suitable tonics were successful in restoring her to a greater amount of general health and strength than she had enjoyed for years previously; but the aphonia and the cough and expectoration continued undiminished.

Such was her state when she first called on me about the middle of November last. Besides the aphonia, she complained of constant pain and feeling of constriction in the throat, and of breathlessness on making the slightest exertion. Her cough was almost incessant, and the expectoration purulent, and occasionally contained small clots of blood.

Laryngoscopy displayed a mass of small ulcers, with red, elevated edges, and deep, hollow centres, situated all over the mucous membrane of the upper part of the larynx and of the glottis itself. The valves of the latter organ did not move at all when even a strong effort at vocalization was made.

Feeling with the finger corroborated the above results, for the surface of the parts mentioned felt as if they were covered with pimples, and had lost their natural softness and elasticity.

Stethoscopy of the larynx indicated that the glottis did not vibrate at all during attempts to vocalize, for they produced not the slightest sound. Indeed during respiration the ordinary laryngeal sounds were unheard, and in their stead was a constant blowing, only interrupted by the gurgling of the muco-purulent fluid in the upper part of the larynx.

There was a slight faintness in the respiratory murmur observable under the left clavicle; but the percussion sound was equally sonorous on both sides.

I may add that my patient was by no means robust, though not positively in bad health, and I have stated enough to warrant the rather guarded prognosis which I gave as to the voice. Indeed, although I have successfully treated a good many cases of obstinate ulcerations in the windpipe, yet I was staggered in this case by the duration and extent of the disease, and at the completeness of the aphonia which it had caused. My patient, however, was full of hope, and I at once commenced the local treatment by bathing the parts daily with a solution of nitrate of silver. I may note here in passing that at first the sponge of the laryngeal probang met with not the least resistance at the glottis, but passed at once below it, showing that it was very unexcitable as well as powerless.

After about four weeks of this and other treatment, some of the ulcers were healed, and the rest had become shallower and less irritable, whilst the cough and expectoration as well as the breathlessness were much diminished; but the voice was still quite absent. It required a continuance of treatment for about other three weeks before the movements of the glottis could be perceived at all; but by that time the ulcers were quite closed, the dyspnoea was not complained of, and the expectoration had ceased. The cough, too, was reduced to an occasional dry tickle, as from an irritated glottis.

The voice from this time rapidly gained strength. It was first loud, rough, and unmanageable, like a boy's at the time of its natural change; but it afterwards became much more natural, and remains quite as strong as it needs to be.

A short time ago this patient caught cold and returned to Glasgow, when I found that one of the ulcers on the epiglottis had re-opened, and caused pain and some cough with expectoration. A few touches of solution of nitrate of silver were sufficient to heal it again; but perhaps there is a significance in this occurrence, as showing that the patient, for some time at least, may be liable to such relapses on exposure to the ordinary causes of cold. I believe, however, that if taken early, as it is likely to be hereafter, the disease may never proceed to such an extent as again to destroy either the voice or the health of the patient.

The course of pathological events in this case seems to me to have been—inflammation and repeated ulcerations of the glottis and neighbouring parts, with exudation of lymph among the muscular fibres of the glottis, as in the case of dissection previously narrated; next came the degeneration of the muscles and their inability to respond to the nervous influence, thus producing aphonia. I regard the spasms as a mere interlude, and one the account of which is too indistinct to be capable of further elucidation by me.

The progress towards cure, on the other hand, was by the following steps: first, the closure of the ulcers, and the absorption of the lymph at their bases; secondly, improved nutrition of the glottidean muscles; and thirdly, their stimulation to a greater degree of irritability. It will be readily perceived by everyone that these steps of the curative process necessarily require much time for their accomplishment; for it is only by a gradual recovery of organs which had long been dormant that the muscles, especially, can be freed from the incubance of exudation, and restored to the capability of action. But even this is only part, and often a small part, of what is implied in the cure of the aphonia. The loss of habitual co-ordination in the movements of the muscles of the glottis, from disuse of the voice, is an evil which only time

and practice in vocalization can remedy. Hence it is that cases of this kind of aphonia, especially when of long standing, are slow of yielding to treatment, and, even when that treatment has been quite successful, appear to be but partially cured, until time has completed the requisite changes in the vocal organ, and renewed the patient's confidence in its use.

The treatment employed in this case was both local and general.

The local treatment consisted, at first, in the application to the affected parts of a solution of nitrate of silver in distilled water. This was done daily, and the strength of the solution was gradually increased from twenty grains to a drachm in the ounce of water, according to the state of the parts as seen in the laryngeal mirror. I believe that such a solution, when of proper strength, and gently applied directly to the diseased part, is the safest as well as the most powerful stimulant and alterative of the laryngeal mucous membrane yet discovered. It should produce little or no pain, and does not act as a destructive agent or caustic at all. I do not approve of the employment of such agents in affections of the interior of the larynx. They are unmanageable and unsafe; and, as the present case shows, they are unnecessary even in the treatment of severe ulcerations.

While applying the solution of nitrate of silver in the morning, I directed the patient to use Siegle's pulverizer every evening with a solution of borax in the appropriate vessel. I believe this soothed the parts, and assisted in the absorption of the lymph and the healing of the ulcers, much in the same way that a lotion or fomentation would have done had the affected part been external.

When the ulcers were all healed, and the thickening at their bases removed, I had merely to do with a weak and long disused set of muscles. I therefore applied galvanism to them directly—not with the view of affecting the motor nerves of the glottis, but simply to excite its muscles to action by this strong and appropriate stimulus, and thus to render them more speedily amenable to nervous influence than can be done by practice in reading aloud. Such practice, however, is always beneficial in restoring the power of modulation, and can never be dispensed with. It was of obvious advantage in the case on which I am commenting, and so in like manner was the singing of a few notes occasionally with the piano.

The general treatment consisted in careful attention to the digestive organs, both by means of medicine and diet; and I likewise prescribed the iodide of potass, in infusion of gentian, pretty freely during the latter part of the time.

II. The second class of aphonic cases, according to the division previously given, is that in which the disease is due to inflexibility of the glottis. This interferes with its vibration in the air passing through the rima, and therefore with the production of vocal sound. These cases generally begin with pain in the windpipe and some degree of hoarseness, ending sooner or later in great weakness and irregularity of voice. For their diagnosis, the evidence of the laryngoscope must be combined with that of stethoscopy and feeling with the finger. The laryngoscope shows that the valves of the glottis move, though feebly, into their proper position for vocalization; but the stethoscope, placed over the thyroid, informs us that, instead of the continuous vibratory sound which should be produced there, there is rather a series of explosive escapes of air through the rima, forcibly opened for its passage. The finger will generally supply the wanting link of the evidence, by giving the sensation of a swelled or hardened, and, in either case, a non-vibratile glottis.

1st. In the former case—viz., that of swelling of the glottis, the morbid affection is almost invariably œdema, which, though often an acute disease, occasionally happens likewise in a chronic form, as the following case will illustrate:—

The patient was a stout female, about thirty-six years of age, and had always enjoyed good health till about eight months ago, when she caught cold. Her symptoms then were pain in the throat, ending in sudden breathlessness and extinction of the voice. From these symptoms she soon recovered, but they speedily returned, again extinguishing her voice; and these attacks have recurred frequently since.

A few days ago she called on me, and gave me the above history of her illness. She complained of pain in the throat, a constant degree of dyspnoea and weakness of voice; and she was in continual fear of a recurrence of the severe form of the disease.

Laryngoscopy showed the glottis to be rather pale and swollen. It moved slowly, and closed imperfectly. The aryteno-epiglottidean folds were likewise bulky.

Feeling with the finger gave similar evidence, and the sounds

heard in *stethoscopy* of the larynx were feeble, and less vibratory than usual.

In fact, this was a case of chronic œdema of the glottis, with frequent acute exacerbations admirably illustrative of that type of the disease. I have treated several such cases to a successful termination, even when the aphonia was almost complete, and the means which I have invariably relied upon are, strong solutions of the nitrate of silver applied directly to the affected parts, fly blisters, or painting the outside of the larynx with tincture of iodine, and a course of combined tonics and aperients.

I have never in chronic cases been obliged to scarify the œdematous swelling, for the beneficial effects of the strong solution of nitrate of silver are very soon perceived in the relief of the dyspnoea. These effects have been noticed by others as well as by myself. They are partly derivative, drawing out the serosity from the œdematous organ, and partly stimulant, exciting the vessels to a more healthy nutrition of the tissues.

2nd. In some cases, however, the inflexibility of the glottis is due, not so much to swelling as to positive induration and thickening of the valves of the glottis. This state of the organ is, no doubt, produced by the organization of exudation-matter thrown out during the inflammatory stage of the disease. It will be obvious that in all such cases the glottidean muscles labour under two disadvantages—viz., the defect of nutrition implied in inflammation of the organ, and fatigue in attempting to overcome the immobility of the stiffened glottis. They thus very rapidly degenerate and lose power, frequently causing a complete and obstinate aphonia.

I had lately a patient under my care for such a state of the glottis. He had been quite voiceless for several years, and was often obliged, in consequence, to give up his employment. He even avoided going into society, his position was so awkward. He had undergone a variety of treatment before he came to me, even including an attempt at the topical medication of the glottis. All had been in vain, however, and he spoke in a faint, husky whisper when he first consulted me.

When I examined him with the laryngoscope, I saw that the glottis was red and granular, and that it did not come together when attempts were made to vocalize. Neither did they vibrate so as to produce any sound audible through the stethoscope placed over the thyroid; while to the finger the parts felt unusually stiff and unyielding.

I bathed the parts with solution of nitrate of silver daily for a fortnight; and I also made the patient inhale pure water for a short time at night, from Siegle's pulverizer. He likewise applied two or three small blisters over the thyroid cartilage, and took the iodide of potass in full doses after each meal.

At the end of this time he was obliged to return to his home, at a distance from Glasgow. The glottis had now become thinner and more vibratile, and it also moved more readily. The voice was very greatly improved, though not yet strong or well regulated. I recommended him, however, to exercise it daily in reading aloud as long as he could do so without pain, which at first was only a few minutes, but became gradually a more lengthened period. He continued this plan for about two months, and then returned to Glasgow, when I found matters in the same favourable state. The appearances on laryngoscopy were quite natural, with the exception of some degree of feebleness in the motions of the glottis, and consequently in the voice of the patient.

I now applied galvanism to the glottis on several occasions, and I think it gave the enfeebled muscles a stimulus in the right direction, for the voice immediately began to improve in force, and soon became sufficiently strong for all ordinary purposes. He then once more returned home, and he has lately written to me that his voice continues as good as ever it was.

I shall not prolong this paper with additional cases, or with one unnecessary remark; but I shall only observe, in concluding, that much of the precision to which we have now attained in the discrimination of the various kinds or causes of aphonia is undoubtedly due to laryngoscopy; and yet I have attempted to show how the information afforded by that art would be often incomplete and unsatisfactory without a due attention being paid to the other means of diagnosis. I think it is also an equally indisputable corollary from the preceding statements, that the success of treatment in aphonia, and indeed in all laryngeal cases, depends very specially on our knowledge of the exact part which is affected, and on our ability to apply directly to it the therapeutic agents suitable to its condition.

Newton-terrace, Glasgow, June, 1866.

THE "Saturday Review" remarks that no Ministry ever made so many medical and surgical baronets as the Russell-Gladstone Administration.