Hoarseness, loss of voice, and stridulous breathing : in relation to nervo-muscular affections of the larynx / By Morell Mackenzie.

HOARSENESS, LOSS OF VOICE,

AND

STRIDULOUS BREATHING,

IN RELATION TO

NERVO-MUSCULAR AFFECTIONS OF THE LARYNX.

BY

MORELL MACKENZIE, M.D. LOND., M.R.C.P.

PHYSICIAN TO THE HOSPITAL FOR DISEASES OF THE THROAT, AND ASSISTANT-PHYSICIAN AND LECTURER ON PHYSIOLOGY AT THE LONDON HOSPITAL.

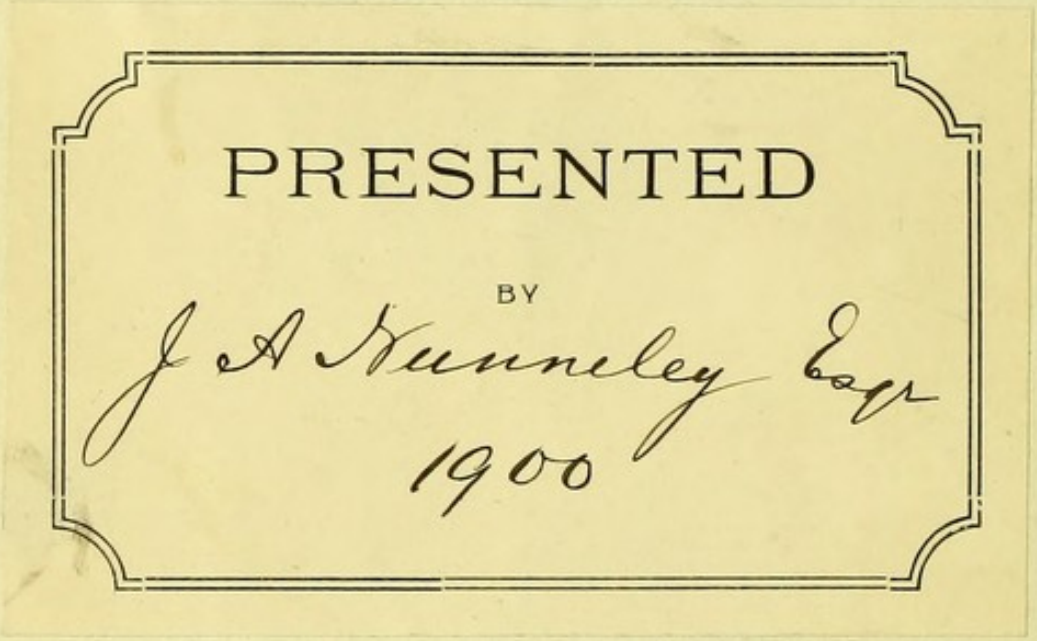
SECOND EDITION, ENLARGED AND REVISED.

LONDON:

J. & A. CHURCHILL & SONS, NEW BURLINGTON STREET.

1868.

PRICE TWO SHILLINGS AND SIXPENCE.



HOARSENESS, LOSS OF VOICE,

AND

STRIDULOUS BREATHING,

IN RELATION TO

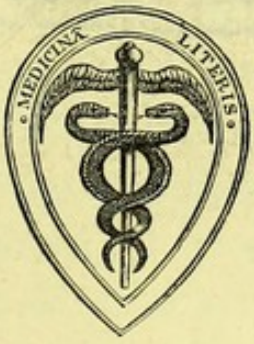
NERVO-MUSCULAR AFFECTIONS OF THE LARYNX.

BY

MORELL MACKENZIE, M.D. LOND., M.R.C.P.

PHYSICIAN TO THE HOSPITAL FOR DISEASES OF THE THROAT, AND ASSISTANT-PHYSICIAN AND LECTURER ON PHYSIOLOGY AT THE LONDON HOSPITAL.

SECOND EDITION, ENLARGED AND REVISED.



LONDON:

JOHN CHURCHILL & SONS, NEW BURLINGTON STREET.

1868.

WYMAN AND SONS,
LAW AND GENERAL PRINTERS,
GREAT QUEEN STREET, LINCOLN'S INN FIELDS, WC.

PREFACE.

In the year 1863 I read a paper at the Annual Meeting of the British Medical Association, on "The Treatment of Hoarseness and Loss of Voice by the direct application of Galvanism to the Vocal Cords." That paper (afterwards reprinted) had an extensive circulation, and the mode of treatment there recommended has since been employed with great success, not only in this country, but also on the Continent and in America.

An experience extending over five subsequent years has led me to discriminate more carefully between the various forms of Paralysis, and whilst still employing the original instrument in the largest number of cases, to use others of a modified form in a somewhat different manner. I have also seen a large number of cases, in which, owing to the paralysis of an opposite set of muscles, the function of respiration has been more affected than that of vocalization, and I have met with some cases in which certain of the laryngeal muscles were spasmodically affected.

During a short vacation last year, I wrote a hurried article for the third volume of the London Hos-

PITAL REPORTS, and in reprinting that article I have considerably amplified it, have re-written certain portions, and incorporated a portion of the original pamphlet. Of the latter, this paper may therefore be considered a second edition.

I venture to hope that, having reference to an almost new field of observation, it may not prove without interest to the profession.

M. M.

13, WEYMOUTH STREET, PORTLAND PLACE,
June, 1868.

HOARSENESS, LOSS OF VOICE,

AND

STRIDULOUS BREATHING,

IN RELATION TO

NERVO-MUSCULAR AFFECTIONS OF THE LARYNX.

THE condition of the nervous system has long been regarded as an important factor in the consideration of some of the morbid phenomena presented by the throat and larynx, but it is only in quite recent times that there has been a possibility of obtaining any evidence on the subject during life; and much has yet to be done in investigating the physiology of vocalization before the pathology of the larynx can be established on a thoroughly scientific basis.

Since we have been able to "hold the mirror up to nature," Türck* and Gerhardt† are almost the only laryngoscopists who have paid much attention to the subject of laryngeal neuroses; and though Ziemssen‡ has made some very judicious observations on the subject of the direct application of electricity to individual laryngeal muscles, the literature of the subject is at present very limited.

NERVOUS AFFECTIONS OF THE LARYNX may be conveniently divided into (1) Diseases of the Motor System; and (2) Diseases of the Sensory System.

* *Klinik der Krankheiten des Kehlkopfes.* Wien, 1866.

† *Virchow's Archiv*, vol. xxi.

‡ *Electricität in der Medizin.* Berlin, 1866.

Diseases of the Motor System.

Under this head we have (*a*) paralysis of the muscles acting on the vocal cords; and (*b*) spasm of the muscles acting on the vocal cords. The paralytic affections of the muscles acting on the vocal cords may be again subdivided as follows:—

1. Bilateral paralysis of the adductors.
2. Unilateral paralysis of the adductors.
3. Bilateral paralysis of the abductors.
4. Unilateral paralysis of an abductor.
5. Paralysis of the tensors.
6. Paralysis of the laxors. (These last two—5 and 6—may also be either bilateral or unilateral.) Some of these paralyses may co-exist together, and indeed are often found associated. Thus paralysis of the tensors of the vocal cords is often met with in combination with bilateral paralysis of the adductors, and it not unfrequently happens that both the adductor and abductor of a vocal cord are paralysed—the vocal cord being permanently fixed in an intermediate position, and neither approaching the median line on phonation, nor being thrown outwards on inspiration.

Before proceeding to consider the paralyses of the larynx in detail, it may perhaps be thought desirable to make a few brief remarks on the anatomical and physiological relations of the part.

It should be remembered that the vocal cords have a fixed insertion anteriorly in the receding angle of the thyroid cartilage, and that whilst in vocalization the two cords are approximated, or *adducted* to the median line, in inspiration they are widely separated, or *abducted* from the median line. The crico-arytenoidei laterales, and the arytenoideus proprius are the *adductors;** the crico-arytenodei postici are the

* Should this change in name meet with approval, it would be well to call the right and left lateral crico-arytenoid respectively the right and left adductor, and the arytenoideus proprius, from its situation, the central adductor. With regard to the last-named muscle, however, there is no doubt that the oblique fibres may act independently of each other, and probably it sometimes occurs that one set of fibres is paralysed without the action of the other being impaired.

abductors. The adductors and abductors have been respectively called the closers and openers of the glottis, but the fact that each muscle may act separately on its respective vocal cord, and that the closing and opening of the glottis are only effected by the consentaneous action of the muscles of both sides, are reasons for preferring a name which at once explains the action of the muscles, and brings their nomenclature into harmony with that employed for the description of other parts of the body.

We now pass on to the consideration of—

BILATERAL PARALYSIS OF THE ADDUCTORS OF THE VOCAL CORDS [CRICO-ARYTENOIDEI LATERALES, AND ARYTENOIDEUS PROPRIUS].

Definition.—Inaction of the adductors on both sides preventing approximation of the vocal cords on attempted phonation, and consequently giving rise to loss of voice.

Synonyms.—Latin, paralysis glottidis, aphonia paralytica, aphonia; *French,* aphonie; *German,* Kehlkopflähmung, Stimmbandlähmung; *English,* functional aphonia, hysterical aphonia, aphonia, nervous aphonia, nervous loss of voice.

Causes.—Debility and hysteria are undoubtedly the most frequent causes of this disorder. It is common in the second and third stage of phthisis; and this is an important fact,* as the aphonia of phthisis is almost invariably attributed to the structural changes which are too frequently encountered in that disease. It is occasionally met with in chlorosis, but it far less commonly occurs in connection with amenorrhœa than might be supposed from the writings of some authors.

* In 1865, in conjunction with, and through the courtesy of, one of the assistant physicians, Dr. W. H. Stone, I examined a number of cases at the Brompton Hospital. Thirty-seven cases of phthisis, in the second and third stage of which the voice was affected, were selected for laryngoscopic examination. In eleven of these the affection was purely functional; in twelve there was thickening of the mucous membrane, and in fourteen there was congestion. I need scarcely say that the treatment of the laryngeal affection differs widely, according as it is of a functional or organic character; and it may not perhaps be out of place to observe that in a case of phthisis the character of the laryngeal disease has a most important influence in prognosis.

More often it is the simply anæmic who suffer from it. Most commonly, however, this form of aphonia originates in catarrhal congestion. The hoarseness and cough disappear, and the voice is entirely lost. Women are far more subject to this form of aphonia than men, and young women more so than old. Still I have treated several cases in which men were the patients. I well recollect a very obstinate case of an engineer, aged about 50, sent to me some years ago at the Throat Hospital by Dr. Drysdale, and I recently treated an old gentleman, recommended to me by Dr. Smyly, of Dublin, for the same affection. I have also had women of advanced years, with this form of aphonia, under my care. On the other hand, I have successfully treated two children—both girls, under ten years of age. Silent people, whether their silence is voluntary or forced, are more subject to functional aphonia than those who are accustomed to use their tongues freely. At a nunnery at the West-end, held by one of the strictest of the contemplative orders, I lately saw, in consultation with Mr. Tegart, two cases, in which prolonged silence, together with the other depressing circumstances of conventual life, had given rise to obstinate paralysis of the adductors. Emotional influences, especially that of sudden terror, very frequently give rise to it. The popular expression "struck dumb with fright," probably refers more to vocalization than articulation; and the embarrassment of those "unaccustomed to public speaking" seems to be occasioned by loss of power of both these functions. Very frequently it occurs as one of the protean forms of hysteria, and these cases are not unfrequently associated with loss of power of articulation, the lips and tongue remaining perfectly immobile when the patient is directed to make an effort to speak. Pressure on the recurrent nerves* sometimes gives rise to it, but more often the nerve on one side only is affected. I have met with one case, however,—a patient under the care of my colleague, Mr. Hutchinson, about three years ago, in which paralysis of the adductors of the vocal cords was

* *Deutsches Archiv für klin. Mediz.* Feb. 22, 1867. Ueber Stimmbandlähmungen, von Dr. Bäumler.

caused by extensive disorganization of the brain. Such cases are, I believe, exceedingly rare.

Sometimes it has appeared to be due to malarious influences, and then has assumed an intermittent character. Professor Gerhardt, who calls attention* to these intermittent cases, also considers rheumatism as a cause of paralysis of the vocal cords, and notices three kinds; viz.,—

1. Meta-rheumatic paralysis of the vocal cords. In these cases acute inflammation of the joints is followed by paralysis of the vocal cords.

2. Catarrhal rheumatic paralysis. In these cases aphonia comes on with catarrh of the mucous membrane of the nose, larynx, and perhaps bronchi, and remains after the catarrh is cured.

3. Direct rheumatic paralysis. This is the result of exposure to draughts of air or taking cold drinks. This kind of aphonia is analogous to facial paralysis.

In the last two varieties, cold rather than rheumatism would, according to English notions, appear to be the exciting cause of the paralysis: I have not met with any cases of the so-called "meta-rheumatic paralysis."

Symptoms.—The most characteristic symptom of this condition is loss of voice; but though the voluntary power of phonation is lost, the reflex function is not generally affected.

The cough and the sneeze are usually accompanied with a distinctly laryngeal sound; the laugh, however, being a much feebler expiratory sound, is not always phonetic. The condition is at once seen with the laryngoscope. On directing the patient to attempt to say "*a*," "*e*," or "*o*," it is seen that the vocal cords do not approximate. They may approach one another slightly, or they may remain perfectly immobile, leaving a large triangular space between them. It not unfrequently happens that though both vocal cords are paralysed, one is affected more than the other. Sometimes the paralysis principally affects the cartilaginous portion of the glottis. In this case, whilst the cords are nearly approximated in their anterior three-fourths, a considerable opening

* *Op. cit.*

remains at the posterior fourth of the glottis. The laryngeal mucous membrane is almost invariably pale, but it may be congested.

Diagnosis.—The only cases which are likely to be confounded with functional aphonia are those in which the loss of voice is due to feeble respiratory action—expiration not being powerful enough to set the cords in proper vibration. Vocalization being a highly compound process—an action in which a large number of muscles must be consentaneously concerned, the failure of one set of muscles often affects the others. Thus, the expiratory action of the chest being very feeble, the vocal cords are less perfectly adducted. In this way a secondary phenomenon is apt to be mistaken for a primary one. This source of fallacy has, however, only to be indicated to be avoided. It must be borne in mind also that the approximative action of the cords may be interfered with by certain mechanical impediments, such as swelling of the inter-arytenoid fold, the presence of growths, or cicatrices, and disease of the crico-arytenoid joints. The laryngoscope, however, at once detects these conditions.

Pathology.—The pathology of the disease has, to a great extent, been encroached upon in considering its ætiology, and it remains only to be said that, as a rule, there is no appreciable impairment of structure either in the larynx, nerves, or nerve-centres. It seems, rather, that the nerve-force is feebly or imperfectly evolved, or that it is not directed in the proper channel. The sudden restoration of the voice, which so frequently takes place, either spontaneously or as the result of treatment, can only be explained by some such theory as this. The muscles which are paralysed are the adductors—the crico-arytenoidei laterales on each side, and the arytenoideus proprius. The latter muscle is probably alone affected when the cartilaginous portion of the glottis only remains open. As already remarked, I have only met with one case in which the affection was due to structural disease, the brain being in that instance affected with a cancerous tumour.

Prognosis.—The prognosis, as regards cure, is almost as favourable as it is in respect to mortality. For although these cases are often very obstinate, and resist a great deal and a great variety of treatment, they are almost always cured in the end. During the last five years I have treated more than two hundred such cases, and, as far as I am aware, in only four instances has the aphonia resisted treatment. In several of these cases the aphonia was of six, seven, and eight years' standing; and in one, the voice was restored after having been lost for ten years. It is exceedingly rare that atrophy of the muscles takes place, a fact which is explicable when it is remembered that in respiration they are constantly, though slightly, called into action. One case, however, of atrophy, or at least of complete and irremediable paralysis, of these muscles has come under my observation. Disease of the brain so rarely gives rise to bilateral paralysis of the adductors, that it is scarcely necessary to say that its presence would most seriously affect the question of prognosis.

Treatment.—Remedies which stimulate the mucous membrane of the larynx—which tend to create a mild spasm of the glottis, are those most rational in principle, and most successful in practice. Emotional influences not only cause, but often cure, this form of aphonia. We have an instance of the power of the mind in restoring the voice nearly two thousand five hundred years ago,* and it would be easy to

* Herodotus remarks (book i. Clio, chap. 85), "We have now to speak of the fate of Crœsus. He had a son, as I have before related, who, though accomplished in other respects, was unfortunately dumb. Crœsus, in his former days of good fortune, had made every attempt to obtain a cure for this infirmity. Amongst other things, he sent to inquire of the Delphic Oracle. The Pythian returned this answer:

> 'Wide ruling Lydian, in thy wishes wild,
> Ask not to hear the accents of thy child;
> Far better were his silence for thy peace,
> And sad will be the day when that shall cease.'

"During the storming of the city, a Persian meeting Crœsus, was, through ignorance of his person, about to kill him. The king, overwhelmed by his calamity, took no care to avoid the blow or escape death; but his dumb son" (ὁ δὲ παῖς οὗτος ὁ ἄφωνος, is the expression), "overcome with astonishment and terror, exclaimed aloud" (literally, broke his voice, ἔρρηξε φωνήν), "'Oh, man,

bring forward many "modern instances" of the extraordinary curative power of emotion. As, however, this is an agency which can scarcely be employed either conveniently or safely by the physician, it is better to employ remedies of more manageable and more local character. There are three kinds of topical remedies which may be employed, all of which act on the same principle. 1st. Stimulant inhalations may be used. I have several times known a vapour impregnated with ammonia restore the voice. The inhalation of chlorine has been successfully used by Dr. Pancoast,* of Philadelphia, and in several cases I have employed the more safe remedy, kreosote vapour, with complete success. In consultation with Mr. Pye-Smith, of Hackney, I recently treated a lady who had suffered from functional aphonia for many months (and whose throat had been most perseveringly swabbed with nitrate of silver for several weeks), with inhalation of kreosote, and the voice was restored in a few days. 2ndly. Stimulant, or strongly astringent solutions, such as nitrate of silver (ʒj. ad ℥j.), or perchloride of iron (ʒij. ad ℥j.) or a saturated solution of tannin, can be applied with a brush to the interior of the larynx; or the silver or iron solutions can be introduced into the larynx in the atomized form. But whilst both the inhalations and local applications often fail, there is one remedy which is almost always successful. *This is* (3rdly) *the direct application of electricity to the vocal cords.* Electricity externally applied seldom restores the voice when it has been lost for any length of time, but it may often be advantageously employed in keeping up the effect produced by the more direct application. The internal current is, on the other hand, almost invariably successful. In other words, when the voice has been restored by the introduction of a pole into the larynx, the effect can often be kept up by the occasional application of the current externally.

In using the direct current, one pole is introduced within the glottis, and the other pole applied externally. In this

do not kill Crœsus!' This was the first time he had ever spoken (ἐφθέγξατο), but he retained the faculty of speech (ἐφώνεε) from this event as long as he lived."

* Wood's *Practice of Medicine*, vol. i. p. 834.

way the voice is often immediately restored. Some few years ago I invented a little instrument called my "laryngeal electrode,"* by means of which the electric current can be applied with great facility to the interior of the larynx. It consists of two parts, viz., the necklet which the patient wears, and to which one chain of the battery is attached, and the laryngeal electrode itself, which is connected with the other conductor. The electrode is so constructed (see woodcut) that the current does not pass beyond a certain point until the pole is seen, in the laryngeal mirror, to be upon the vocal cords, when the operator touches a little spring in the handle, and the current immediately passes through the laryngeal muscles. The necklet should be worn rather low, so that it covers the sides of the cricoid cartilage, and the space between it and the thyroid. In this way the lateral adductors of the cords (crico-arytenoidei laterales) can be most easily reached; and the arytenoideus proprius, or central adductor, may be electrified by placing the pole on the posterior surface of the arytenoid cartilages.

So many cases showing the value of this kind of treatment have already been published, that I do not think it necessary to give more than three or four illustrations. I shall therefore select four of the most recent cases, and relate them very briefly; before doing so, however, I may observe that the electricity possibly, and perhaps probably, does not act *directly* on the muscles paralysed, but *indirectly*, through reflex action, by causing a kind of spasm of the glottis. When one pole is placed on the vocal cords, and the other on the neck externally, between the thyroid and cricoid cartilages, the electric current must doubtless pass through the adductors; but it is more probable that the contraction of these muscles is of a reflex character, brought about by the electric shock to the sensitive nerves. The sudden restoration of the voice in some cases, after one application of electricity, indicates that the curative influence in these instances is in all probability of an emotional character.

* I formerly called this instrument "a laryngeal *galvanizer*." In accordance, however, with its strict use, I now employ the term used in the text.

I generally keep the pole in the larynx for three or four seconds each time it is introduced, and pass a succession of short rapid shocks through the larynx; and at each sitting I apply the pole to the interior of the larynx three or four times. The source of the electricity is not a matter of any importance. I find equally good effects follow whether a battery or a magneto-electric machine is employed.

Out of more than two hundred cases that I have treated in this way, I have only met with four cases in which the treatment was not successful. In three* of these no effect was produced, and in the fourth such violent hysterical attacks came on whenever the treatment was attempted, that it was obliged to be discontinued.

As a general rule, it is important not to allow too long an interval to elapse between each application of electricity. Sometimes one or two applications of electricity are sufficient; but in most cases the current should be applied every day for the first week, every other day in the second week, twice in the third week, and once in the fourth week. I have often known practitioners fail for want of pursuing some such plan as this. In those rare cases in which the paralysis of the adductors is due to actual pressure on the nerves, it is needless to observe that electricity is almost, if not entirely, useless. A case was lately brought to me at the London Hospital, by Mr. James Adams, which exemplifies this statement. The patient, residing at Walthamstow, was unable to attend very frequently as an out-patient; and the voice, though generally lasting for a few days after the application of the electric current, was usually lost before she was again able to visit the Hospital. When, however, on my recommendation, she remained in the Hospital for a week or two, under Mr. Adams's care, the voice was permanently restored.

In addition to the modes of treatment already referred to,

* In one of the unsuccessful cases the patient, a lady, aged about 40, was under the care of Sir Henry Thompson for severe disease of the knee-joint. As an evidence of the extreme difficulty in making any impression in this case, I may remark that the thigh has since been amputated *without chloroform*, and that the patient bore the operation without uttering the faintest sound.

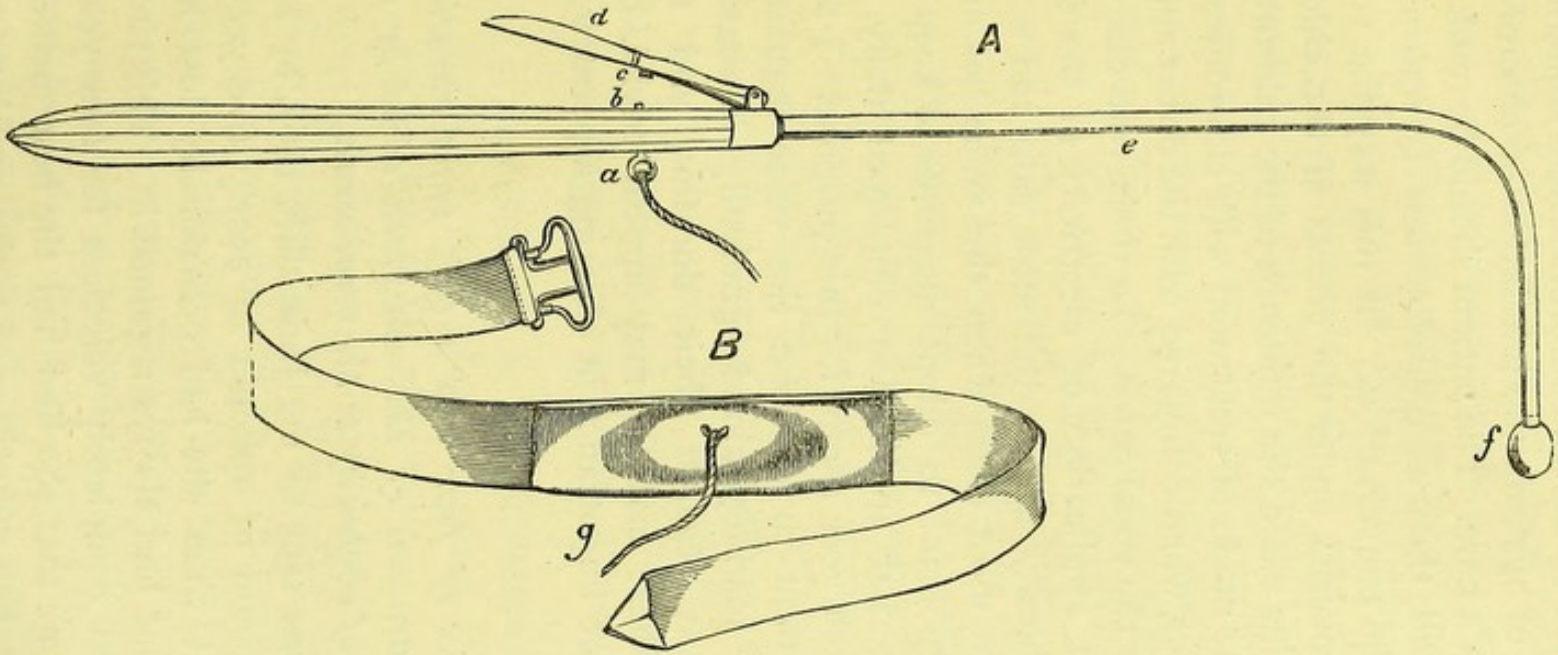


FIG. 1. LARYNGEAL ELECTRODE AND NECKLET.

A. The laryngeal electrode. *a*, a metal ring by which the electrode is connected by a chain either with a battery or magneto-electric machine; *b*, the extremity of a wire communicating with *a*; *c*, metal point, which, when the ivory handle, *d*, is pressed upon, touches *b*. The current then passes along the wire, *e* (which is insulated in caoutchouc) to the sponge, *f*. The handle of the instrument is of wood or glass.

B. The necklet which the patient wears. *g*, the chain by which the necklet is connected to the apparatus producing the electricity.

I should mention that where the aphonia is associated with or dependent on hysteria, the ordinary anti-hysterical treatment, especially the use of the cold shower-bath, is sometimes successful. In cases of hysteria the inhalation of chloroform also frequently effects a cure. The patient should be rendered quite unconscious, and then, as consciousness is returning, should be engaged in conversation. In this way the voice which was lost is recovered under the effects of the chloroform, and often remains when the influence of the chloroform has passed away. The mode of treatment with chloroform is very uncertain, however, when compared with the direct application of electricity to the vocal cords. To those who can use the laryngoscope, the application of electricity in the way described will undoubtedly appear the most safe and satisfactory procedure. In most cases when the voice has once been restored, it is important to adopt measures to keep up the effect. The external application employed daily, or every other day, is often very useful for this purpose. I also always direct the patient to exercise the voice regularly, by counting aloud, reading aloud—gradually increasing the exercises, both as regards their duration and the loudness of voice. These matters may appear trivial, but they are really of great importance in effecting a permanent cure.

CASE I.—*Loss of voice of four and a half years' duration, from bilateral paralysis of the adductors, cured by the direct application of electricity to the vocal cords.*

Miss D., aged 43, was sent to me June 28th, 1867, by Mr. Le Gros Clerk, on account of aphonia of nearly five years' standing. Before that time she had occasionally lost her voice for a few days, but had always regained it. This time, however, she had been completely voiceless for four years and a half. She told me that she had had the best medical advice; that she had taken quantities of tonics, cod-liver oil, &c.; that her throat had been painted inside and outside; that she had tried many kinds of gargles, &c., but all without effect. She stated that she felt very well, could stand a fair

amount of fatigue; and though she had been repeatedly told that "as she got stronger the voice would return," she had not found this to be the case. She showed no signs of hysteria, had never had an attack of hysterics, and both she and her sister informed me that she was not inclined that way. I mention this circumstance, as many practitioners are apt to call every case of this sort "hysteria." On making a laryngoscopic examination, it was seen that though on attempted phonation the vocal cords moved slightly towards the median line, they did not nearly approximate. The mucous membrane of the larynx was pale, but there was no organic disease. The case was therefore clearly one of paralysis of the adductors of the vocal cords.

I applied the electric current directly to the vocal cords daily, and after the fourth application the patient was able to sound her voice. After this the application was gradually left off—longer intervals being allowed to elapse between each visit, until the end of three weeks, when the patient was discharged cured. The perfect restoration of the voice was very gradual in this case; thus at the end of the first week it was very feeble, jerky, and spasmodic; at the end of a fortnight it had lost its jerky character, and was merely feeble; whilst at the end of three weeks it was quite natural.

CASE II.—*Aphonia of six months' standing, from a-symmetrical paralysis of the adductors, cured by the direct application of electricity to the vocal cords.*

Mrs. S., of Warwick, aged about 50, was sent to me June 29th, 1867, by Mr. Ruttledge, on account of loss of voice of six months' standing. A laryngoscopic examination showed that the aphonia was due to paralysis of the adductors of the vocal cords, for on attempted phonation they remained widely separated. A slight difference, however, could be noticed in the action of the two cords—the right advancing rather nearer to the median line than the left. For some years her voice had been weak, but she had never lost it for so long before. The third or fourth application of electricity restored the voice, and though the lady took cold

and was thrown back a few days, at the end of three weeks she was able to return home perfectly cured.

CASE III.—*Loss of voice of eighteen months' duration, from paralysis of the adductors, cured by one application of electricity to the vocal cords.*

Louisa C., a servant, aged 23, from Newbury, was admitted into the Hospital for Diseases of the Throat, July 4th, 1867. Though stout, she was rather weak, and fainted on her first visit to the Hospital. For this reason she was received as an in-patient. She stated that her loss of voice was a serious drawback to her, and that it prevented her getting a situation.

It was seen that the vocal cords scarcely moved at all towards the median line on attempted phonation. One application of electricity restored the voice, and after remaining in the Hospital two or three weeks to get her strength up, she was discharged "cured."

CASE IV.—*Aphonia of three years' duration, from paralysis of the adductors, cured by the direct application of electricity to the vocal cords.*

Fanny S., aged 20, was admitted into the Hospital for Diseases of the Throat, July 14th, 1867, on account of loss of voice of three years' duration. Eight months previously she had applied at the Hospital, and her voice had been restored on several occasions by the direct application of electricity; but the effect had always been very transient, the voice having generally been lost again after a few days. At that time she lived at some distance from the Hospital, and could not visit it very often, and for the same reason it was nesary now to make her an in-patient. The laryngoscope showed that the case was one of paralysis of the adductors of the vocal cords. After three applications of electricity to the vocal cords, the voice was fully restored, and since July 20th the voice has remained strong.

CASE V.—*Aphonia from paralysis of the adductors of the vocal cords in the course of pericarditis.*

C. R., aged 22, shoemaker, a pale-looking and badly-nourished young man, who had from his childhood suffered a good deal from rheumatic pains, and more recently from palpitation of the heart, was admitted into the German Hospital, Dalston, on January 8th, 1866, with pericarditis, and with various symptoms of syphilis, which he had contracted about six months before. Besides a very loud systolic murmur at the apex of the heart, which pointed to old-standing mitral disease, there was well-marked pericardial friction-sound, and the cardiac dulness extended upwards to the incisura jugularis, and even a little beyond the right sterno-clavicular articulation. His voice, which on admission was rather husky, became after a few days a mere whisper. As there was slight ulceration of both tonsils, it was thought the loss of voice might be due to some morbid change in the larynx of a syphilitic origin. The laryngoscope, however, at once refuted this idea, for although it revealed two small mucous tubercles on the inner surface of the epiglottis, it showed that the larynx itself was perfectly sound, and that the aphonia was due to paralysis of the adductors of the vocal cords, which on attempted phonation remained widely separated: the arytenoid cartilages showed only a slight trembling movement. The pericardial effusion gradually diminished, and about a fortnight after the aphonia had become complete the voice began to return; for some time, however, the lower notes only could be produced, although the laryngoscope showed that the mobility of the vocal cords was perfectly restored. The impairment which remained for some time longer was due to catarrhal congestion of the mucous membrane of the larynx, which had come on after the paralysis had disappeared. In the beginning of March he left the Hospital, much improved in his general health, and with his voice nearly in a normal state, but had to return on the 26th, as the heart's power began more and more to fail. Although he suffered a great deal from dyspnœa, and was at

times exceedingly weak, his voice remained unaffected until his death, on the 19th of May.*

Unilateral Paralysis of the Adductors (of a Vocal Cord).

Definition.—Inaction of the adductors on one side, preventing the approach of the corresponding vocal cord to the median line, and consequently giving rise to hoarseness or loss of voice.

Causes.—The condition may be due to chronic toxæmia (lead, arsenic,† diphtheria, &c.), may result from cerebral disease, or may be caused by cold, or muscular strain. I have met with it after smallpox, in constitutional syphilis, and in phthisis. As regards the aphonia, so commonly met in phthisis, Dr. Mandl‡ thinks that it is frequently due to paralysis of the right vocal cord, from pressure on the recurrent nerve of the same side. In support of this view, he states that whilst in fifty-two cases where the apex of the right lung alone was affected, fifty of the patients were hoarse, in thirty-two cases where the left apex was affected, only one of the patients was hoarse. Dr. Mandl accounts for this difference by reminding us that whilst the left recurrent nerve winds round the aorta, the right recurrent passes in close contact with the apex of the lung, and is therefore likely to be pressed upon by the morbid deposit, or the pleuritic inflammation at the apex, to which it so often gives rise. Dr. Ogle,§ also, in an interesting paper, observes as follows: "My impression has long been (and, indeed, according to my experience, post-mortem research has demonstrated it to be so), that the affection of the voice in this

* This unique case was originally contributed to the *Deutsches Archiv für klin. Medizin* (Ueber Stimmbandlähmungen, Feb. 22, 1867) by Dr. Bäumler, Assistant Physician to the German, and Victoria Park, Hospitals. I am indebted to that gentleman for making an abstract of it for this article.

† See a case in the London Hospital, recorded in *Medical Times and Gazette*, January 11th, 1862.

‡ *Gazette des Hôpitaux*, No. 135.—1862.

§ *Transactions of the Pathological Society*, vol. x. p. 343.

disease (phthisis) is by no means unfrequently quite unconnected with any altered condition of the mucous membrane of the parts forming the upper outlet of the larynx, such as we do very frequently meet with in this class of cases, and which, either alone or with an attendant affection of the vocal cords, completely accounts for the hoarseness or other altered conditions of the voice, cough, &c. I see no improbability in conjecturing that the nervous structures abounding at the upper part of the chest (and among them the recurrent laryngeal or the main trunk of the pneumogastric nerve) may in some cases become involved." My own experience points rather to functional aphonia and enfeebled expiration than any special implication of the nerves. Still I have at different times met with cases of phthisis in which the adductors were paralysed. My observations, moreover, do not accord with those of Mandl as regards the side affected, for out of seven cases of phthisis in which a vocal cord was motionless, in six the left vocal cord was at fault. In the two cases (Cases XI. and XII.) now recorded, the lung and vocal cord were affected on opposite sides, though of course there might have been undetected disease of the lung on the same side. Sometimes the paralysis is due to the pressure of an aneurism, or other tumour, on one of the recurrent nerves. The left nerve* is affected through the arch of the aorta, and the right† recurrent through the subclavian or right carotid artery. The really important muscular affection in these cases, however, is the paralysis of the *abductor* of the vocal cord. In many cases of unilateral paralysis of the adductors, the cause is involved in obscurity. The ætiology of the affection will be illustrated by some of the cases presently to be related.

Symptoms. — The condition is at once seen with the

* See my case in *Med. Times and Gaz.*, 1864, vol. i. pp. 34 and 643.

† The only recorded case of paralysis of the right vocal cord (adductors and abductor—but especially the latter) from an aneurismal tumour, is, I believe, that of mine, in the *Medical Times and Gazette*, 1866, vol. ii. p. 637. The lower part of the right common carotid was the seat of the disease, and though there was no post-mortem confirmation, the symptoms left no doubt as to its existence.

laryngoscope. On attempted phonation, the affected vocal cord remains at the side of the larynx, whilst the healthy one is well adducted to the median line. The mucous membrane covering the affected vocal cord may be healthy, but is often congested. There is aphonia or dysphonia, and usually an absence of constitutional symptoms. When the affection is due to cerebral disease, there is usually paralysis of other parts (the tongue, palate, or perhaps one side of the body). When the paralysis of the adductors on one side is complete, or even much marked, the acts of coughing, sneezing, and laughing are always altered in character, and often unaccompanied by sound; indeed, a modification of the natural cough or sneeze is often one of the earliest symptoms of the condition. The affection is not unfrequently associated with slight dysphagia —probably dependent on imperfect action of the epiglottis in deglutition, or on some loss of power of the superior and middle constrictors.

Diagnosis.—The most likely source of error in examining a case of this sort, is to be found in swelling of the ventricular band (false vocal cord). When the ventricular band is much swollen, it more or less eclipses the true cord on the same side. It thus happens that when the larynx is examined, one vocal cord is seen to be adducted well to the median line, whilst the other is not visible at all. A little practice with the laryngoscope will enable the observer to recognize the true nature of the case. Symptoms of a paralytic character are sometimes produced by destruction or impairment of one of the crico-arytenoid joints from ossification or other morbid changes. In these cases there is generally some abnormal appearance, such as enlargement or swelling about the base of the arytenoid cartilage. Simple impairment of the articulation is sometimes met with in old age.

Pathology.—As regards the pathological anatomy, I may observe that in the only case of this disease—a case of seven years' standing which I have examined after death—there was considerable atrophy of the left adductor (crico-arytenoideus lateralis) on the affected side. The arytenoideus proprius did not appear to have suffered. The disease is

probably often due to inflammatory exudation, either of a simple or dyscrasic character, into the substance of the muscle. I have met it two or three times in tertiary syphilis, in cases where there did not appear to have been any ulceration of the larynx. In these cases there was, probably, deposit in the substance of the muscle. When the affection is accompanied with loss of power on the same side of the tongue and palate, it indicates serious cerebral disease near the nucleus of the spinal accessory nerve. Pressure on the pneumogastric, or its recurrent branches, does not often give rise to this form of paralysis.

Prognosis.—The condition not being in itself dangerous, and being generally due to local causes, need not, as a rule, give rise to serious apprehensions. If, however, there is evidence, such as the paralysis of other parts, to show that the disease is due to cerebral causes, the prognosis is, of course, serious. Only those cases which are due to chronic toxæmia, or cold, are amenable to treatment.

Treatment.—When the condition of the larynx is due to cerebral disease, it is of little importance in comparison with the state of the brain itself. In these cases, treatment directed to the larynx would be perfectly useless. Where the affection is due to chronic toxæmia, the direct application of electricity to the muscles of the affected cord often does good; but in those cases the nature of which is involved in obscurity, and which appear to me to be due to an affection of the muscles themselves, no treatment seems of any avail. Perhaps it would be more correct to say that, in recent cases, the voice can generally be restored without much difficulty; but where the aphonia has been of many years' standing before a laryngoscopic examination has been made, treatment is of little use. For here it is not as in bilateral paralysis, where the reflex action of the muscles is not interfered with. On the contrary, in these cases there does not appear to be the slightest movement, either in simple expiration, or in the various expiratory acts. I have latterly, in some cases, employed my laryngeal electrode in a modified form. I call the original instrument

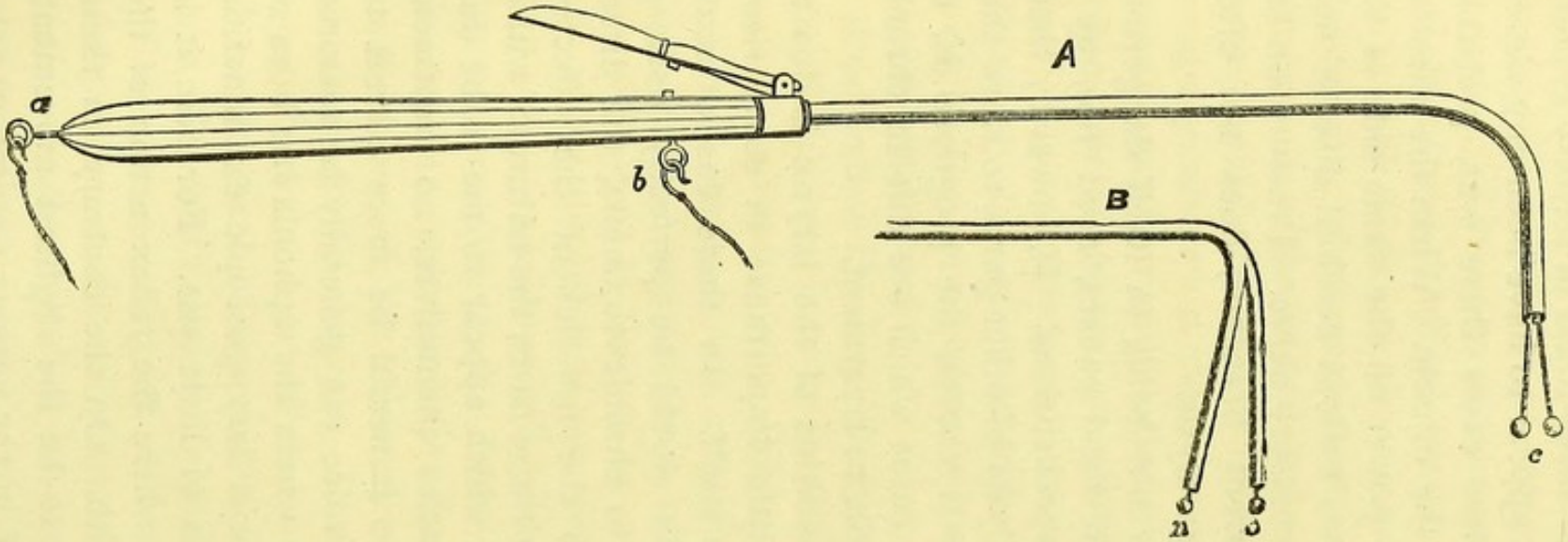


FIG. 2.

Fig. 2 represents my laryngeal electrodes, Nos. 2 and 3. The two poles are united in the same instrument—one wire going to the ring *a*, the other to the ring *b*. The two rods are carefully isolated, so that when the little handle on the upper part of the instrument is touched, the current passes between the two brass knobs.

A represents No. 2 electrode. This is useful for electrifying the surface of the vocal cord, and indirectly the thyro-arytenoid muscles, the arytenoideus proprius, and the posterior crico-arytenoid muscles. The current passes between the two knobs at *c*.

B represents No. 3 electrode. It is introduced into the larynx in such a way that the pole, *o*, is in contact with the vocal cord, and *n* passes into the hyoid fossa. In this way the lateral crico-arytenoid is embraced between the two poles. The extremity of the hyoid electrode should be about five-eighths of an inch distant from, and slightly posterior to, the pole which is applied to the vocal cord.

(Fig. 1) No. 1. Then I have an instrument No. 2* (Fig. 2, A), which contains two electrodes together, carefully insulated and separated at their extremity by about one-eighth of an inch. This is very useful, for the electrization of the thyro-arytenoid, arytenoideus proprius, or posterior crico-arytenoid muscle. In laryngeal electrode, No. 3 (Fig. 2, B), the extremities of the two poles are separated about five-eighths of an inch, or rather more. This instrument is introduced so that the extremity of one pole is in the larynx, the other in the hyoid fossa. In this way the current passes right through the lateral adductor of the vocal cord, to which it is applied. This instrument is particularly useful in the class of cases now under consideration. The instrument is constructed so that when introduced the outer or hyoid pole is slightly posterior to the inner or laryngeal pole.

The following cases are put on record—though I am aware that many of them are "wanting in point"—because very few of the kind have been already published, and because the difficulties surrounding the subject are so great, that very many cases must be related before any general conclusions can be drawn.

CASE VI.—*Paralysis of the adductors of the right vocal cord, with aphonia of five months' duration (from chronic lead-poisoning), cured by the direct application of electricity to the affected muscle.*

W. H., a painter, aged 35, applied at the Hospital for Diseases of the Throat, in December, 1865, on account of loss of voice of five months' standing. He stated that for the last four years he had been very subject to colic, and that in July, 1865, he had suffered from an attack of paralysis of the right hand. For the latter affection he had attended at the Middlesex Hospital, and the wrist had now quite recovered its power. The patient was thin and pale, but he had not the miserably unhealthy appearance often present in these cases. The lead-line at the margin of the gums was distinctly seen. On making a laryngoscopic examination, the

* This modification of my instrument was first proposed and employed by Dr. Fauvel, of Paris.

adductive action of the right vocal cord was perceived to be completely in abeyance.

The patient was ordered bark and iodide of potassium, and electricity was applied to the affected muscles—one pole being introduced into the larynx, the other placed over the larynx externally. At the end of three weeks the patient was able to speak, though in a shrill falsetto kind of voice. Subsequently the treatment was continued, though less frequently, at first on alternate days, and afterwards every third day for two months, when the action of the vocal cord was perfect, and the voice completely restored.

CASE VII.—*Aphonia of ten months' duration (after diphtheria)—partial paralysis of right adductor—cured by the direct application of electricity to the affected muscle.*

Mr. Charles E., aged 19, of Brighton, came under my care June 15th, 1865. He stated that at the end of July, 1864, he had suffered from a severe attack of diphtheria, and that on recovering from the acute stage, he had experienced great difficulty in swallowing, and loss of voice. The power of swallowing was now, to a great extent, recovered, though he still had occasional attacks of coughing from "things going the wrong way" whilst he was taking his meals. This accident was especially apt to occur in drinking. From prescriptions which he showed me, I saw that he had been taking iron, quinine, and latterly strychnia, and he told me that for six weeks electricity had been daily applied to his throat externally. The voice, however, had not at all improved. A laryngoscopic examination showed slight paralysis of the adductors of the right vocal cord.

This patient did not come regularly under my care till the middle of August. On the 16th of that month I commenced applying the current through the affected muscle—one pole being introduced into the larynx, and repeated the operation every day till the 10th of September. By this time the patient was able to sound his voice, though he usually spoke in a whisper. Ten days later the *sound* of the voice was the rule rather than the exception, and by the middle of October the patient was able to speak in a strong, clear voice, which to

me appeared perfectly natural, although he thought that "it sounded differently to what it had done before his illness." The action of the right cord appeared perfectly normal.

CASE VIII.—*Dysphonia of fourteen months' standing, from paralysis of the adductors of the left vocal cord, after diphtheria, cured by electrization of the vocal cords.*

Patrick O., aged 19, was sent to me in April, 1863, but I first commenced treatment in the middle of May. The patient stated that in March, 1861, he had an attack of diphtheria; that since that time he had always found great difficulty in speaking aloud, and that when he did succeed, his voice was always "very squeaky." On looking into the throat, the pillars of the fauces presented a peculiarly atrophied appearance, and on the posterior wall of the pharynx there were several lumps of inspissated mucus. On using the laryngoscope, and directing the patient to say "Eh," it was seen that, whilst the right vocal cord advanced well to the centre, the left vibrated slowly, without moving at all towards its fellow. The sound produced was in the falsetto register, and he was unable by the most violent efforts to produce a chest-note. He stated that before he suffered from diphtheria he had a remarkably loud and strong voice.

On the application of electricity to the cords, he at once spoke in the chest-register. The high-pitched squeaking voice soon returned, however—according to the patient's account, "directly he got into the open air." Electric shocks were continued, first every day, and afterwards every two or three days, for two months, when the voice having been restored for more than a fortnight, and the left vocal cord acting perfectly, it was not thought necessary to continue the treatment. [No general remedies were employed in this case.]

CASE IX.—*Loss of voice of four months' duration—paralysis of the left adductors—cured by the direct application of electricity to the affected muscles.*

Christopher B., aged 37, a police sergeant, consulted me in March, 1867, on account of aphonia, which had come on

suddenly in the previous December, after a night of great exposure. He stated that he had gone to bed very wet and cold at about three o'clock in the morning with his voice in its usual state, but that when he woke up the next morning he could only whisper. Thinking that it was only a cold, he had done nothing for it for ten days, when, there being no improvement, he consulted a surgeon. He had taken a good deal of medicine, and had tried inhalations of vinegar in hot water, but without restoring the voice. On examination with the laryngoscope, the aphonia was seen to be due to paralysis of the adductors of the left vocal cord. As there was some difficulty as regards the patient seeing me often, I advised him to try the effect of external electricity. This he did for a month, having had a current applied through the larynx three or four times during that period. No improvement taking place, on April 10th I began to apply the direct current daily; and after the fifth application a feeble sound was heard. I then applied it every day till the 25th, when the voice, though weak, was generally sounded. The patient was obliged to go away on the 30th; but by continuing the external current he fully recovered his voice at the end of May.

CASE X.—*Aphonia of six weeks' duration, caused by paralysis of the adductors of the right vocal cord (from exposure to cold), cured by the inhalation of kreosote.*

Mr. A. W., aged 44, residing at Notting Hill, was seen by me on March 19th of the present year, in consultation with Dr. Vinen. The history of the case was as follows. At the beginning of February, Mr. W. was in very good health, and his voice perfect, but on the 4th of that month, in the intensely cold weather which occurred at that time, Mr. W. spent a few hours one evening at a neighbour's house, and walked home afterwards. The next morning his voice was completely gone, and he had great difficulty in swallowing. Under Dr. Vinen's care he had taken diaphoretics and other suitable treatment, and as the pharynx was seen to be much congested, Dr. Vinen had several times applied solutions of

nitrate of silver to the back of the throat. Notwithstanding, however, that the pharyngeal congestion had passed away, there was no improvement in the voice, and when I examined the gentleman on the 19th March he was completely aphonic. The difficulty of swallowing, complained of at the commencement, had passed away at the end of about three weeks.

A laryngoscope examination showed complete paralysis of the adductors of the right vocal cord, and an otherwise healthy larynx. We prescribed a kreosote inhalation (3j. in a pint of hot water) to be used thrice daily. After employing it a few times, the voice began to return, and on the 11th of April the patient was speaking in a clear natural tone.

CASE XI.—*Dysphonia from paralysis of the adductor of the left vocal cord.—Consolidation of the upper third of the opposite lung.*

Mr. F. C., aged 61, was sent to me in October, 1866, by Mr. Clowes, of Windermere. The patient was a literary man, who had never been very strong, and whose health during the last two years had failed a good deal. Since January, 1865, his voice had been slightly affected—at first having been hoarse, and latterly almost completely suppressed. He had himself noticed the peculiarity of his cough, which scarcely sounded at all; and on being questioned about his sneezing, he told me that he seemed scarcely able to sneeze, the act always appearing as if it were balked (no doubt from imperfect closure of the glottis).

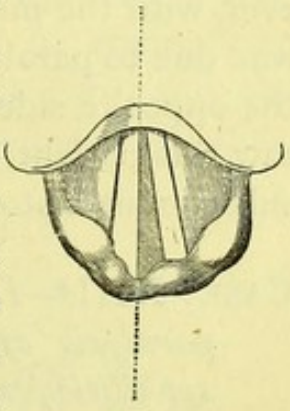


FIG. 3. Attempted phonation. The left vocal cord is not adducted to the median line: consequently a space remains between the vocal cords, and the voice cannot be sounded.

An examination with the laryngoscope showed that the adductive action of the left vocal cord was completely in abeyance. The appearance is shown in the annexed cut. On investigating the state of the chest, there was found to be extensive consolidation of the upper part of the right lung—the opposite side to that on which the vocal cord was affected.

Inhalations have been tried in this case, without any decided result; and the patient has not hitherto been able to give up the time to undergo a special course of local treatment.

The next case is remarkably like the preceding, and for this reason is, I think, worthy of record.

CASE XII.—*Dysphonia, caused by paralysis of the adductors of the left vocal cord, with tubercular deposit in the opposite lung.*

Mr. S., aged 45, was sent to me in August, 1866, by Dr. Marriott, of Leicester. During the last three or four years he had shown symptoms of incipient phthisis, and latterly had become a good deal emaciated, and had had several attacks of hæmoptysis. The voice, which was weak and harsh, but not entirely lost, had been affected during the last six months. There was considerable consolidation at the apex of the right lung. Had I been called upon before the invention of the laryngoscope, to give an opinion as to the state of the larynx in a case of this sort, I should certainly have attributed the laryngeal symptoms to a tubercular affection of the tissues of the larynx. On inspecting the larynx, however, with the mirror, it was at once evident that the aphonia was due to paralysis of the adductors of the leftvocal cord—the opposite side to that on which the lung was affected. I saw this patient on only one occasion, and do not know the subsequent history of the case.

CASE XIII.—*Dysphonia of two years' standing, from paralysis of the adductors of the left vocal cord in a syphilitic person.*

Sarah H., aged 30, a shopman's wife, became, in January, 1867, an out-patient at the Hospital for Diseases of the Throat, where she is still attending. From the history of her case it appeared that ten years previously, shortly after her marriage, she had suffered from syphilis. Her first two children had died soon after birth, but she has since borne three healthy children. Two years ago she had an ulcerated sore-throat, and not long afterwards an ulcer of considerable size formed

on the palate; at the same time her voice became hoarse, and has remained so. She used to have great difficulty in swallowing liquids, but has latterly got better in this respect. Every kind of treatment, including inhalation of hot vapours, atomized liquids, the local application of electricity, the administration of iodide of potassium, has been tried in vain.

CASE XIV.—*Dysphonia of many years' duration, from paralysis of the adductors of the left vocal cord.*

Sarah F., aged 41, an engineer's wife, is now under my care at the London Hospital, and has been under treatment since April 2nd, 1867. She stated that she had been hoarse from childhood, when she had an attack of measles, but that three months ago she caught cold, and since then her voice had been much worse. The dysphonia was evidently due to paralysis of the adductors of the left vocal cord; the larynx was otherwise healthy. The left ary-epiglottic fold, with its contained cartilages, was seen to be on a higer level than the right one, making the upper opening of the larynx unsymmetrical. On attempted phonation, the right vocal cord advanced beyond the median line, so as to compensate for the insufficient action of the left vocal cord, and the capitulum Santorini passed behind and beyond its fellow.

FIG. 4. Paralysis of the adductors of the left vocal cord.

A Inspiration.

B Attempted phonation. The right vocal cord is seen to pass even beyond the median line, and the capitulum Santorini to pass across the left.

The appearance in inspiration and attempted phonation is shown in the annexed woodcuts.

CASE XV.—*Dysphonia of two years' standing, from paralysis of the adductors of the left vocal cord.*

Jessie C., a teacher, aged 27, was sent to me at the Throat Hospital by Mr. Edwin Canton, on September 30th, 1867, on account of loss of voice, which had been coming on for two years. She was slightly hoarse for six months, but then suddenly lost her voice completely, and for the last eighteen months has not been able to speak above a whisper.

On a laryngoscopic examination it was seen that, when phonation was attempted, the left vocal cord did not move from the side of the larynx, while the right vocal cord approached well to the median line. The coloration of the larynx was perfectly normal. The patient was rather weak and anæmic, but there were no signs of chest disease.

The cause of the paralysis was involved in obscurity, but the patient was completely cured by the direct application of electricity.

CASE XVI.—*Dysphonia of six weeks' duration, from paralysis of the adductors of the right vocal cord; restoration of voice by direct application of electricity to the affected muscles.*

Rev. H. A., aged 29, applied to me in May, 1867, on account of dysphonia of six weeks' duration. In the beginning of March he had not been feeling at all well for some time, and had been unusually hard worked as a London incumbent, when he found one evening, after preaching in a hot and crowded church, that he was unable to speak above a whisper. After resting for a few days in town, not feeling any better, he went down to the neighbourhood of Torquay, and passed a fortnight there. The voice not having improved, he returned to London and consulted a surgeon, who attributed his hoarseness to an enlarged tonsil, and accordingly removed a portion of the left gland. A fortnight later, on the 6th of May, the patient consulted me, and on making

a laryngoscopic examination, I found that the adductive action of the left vocal cord was entirely in abeyance, and that the cord itself was a good deal congested. A solution of perchcloride of iron (℥ij. ad ℥j.) was applied every day to the larynx for eight days, and at the end of that time the congestion had quite disappeared; but neither the action of the vocal cord nor the voice had at all improved. The internal application of electricity was then adopted every day. No effect whatever was produced for a week, but on the 27th of May, about three weeks from the time I first saw him, he was able to sound his voice; after this the voice gradually became stronger, and when he left town in the middle of June, by my advice for a tour in Switzerland, the voice was perfectly restored.

CASE XVII.—*Dysphonia from paralysis of the adductor and abductors of the right vocal cord, with other symptoms of diseased innervation—all confined to the right side.*

This was the case of a labouring man (J. G.), aged 50, under the care of my colleague, Dr. Hughlings Jackson. The voice was not completely lost, but was very weak and shrill, and the breathing was slightly stridulous. When I made a laryngoscopic examination in December, 1866, the right vocal cord seemed to be permanently fixed in an intermediate position, so that it was neither abducted in inspiration, nor adducted in vocalization. The affected cord was perfectly immobile. There was some tumefaction of the right ventricular band, and the right side of the epiglottis was slightly swollen, distorted, and pushed towards the left side. "The other defects were," as Dr. Hughlings Jackson described, "all on the right side. The right half of the tongue was greatly wasted, the right half of the palate hung forwards a little, and was drawn up to the left when the patient cried *Oh!* and there was nearly complete deafness of the right ear." There was an exceedingly hard tumour, rather longer and narrower than a hen's egg, extending downwards, behind the angle of the lower jaw on the right side; on the opposite side there was a similar but

much smaller tumour. He had a constant sensation of pain and stiffness at the back of the nose, though nothing could be seen with the rhinoscope; and he several times suffered from severe hæmorrhage—to the extent of a pint or more on one or two occasions, the blood coming down the nose into the mouth. Dr. Jackson thought the tumours syphilitic,—and fourteen years previously the patient had undoubtedly suffered from syphilis; but I inclined to the idea of their being carcinomatous. In any case, however, there can be little doubt but that Dr. Jackson's opinion that there was disease of the brain near the origin of the spinal accessory, and of several other cranial nerves of the right side, was correct.—The organic disease (distortion of epiglottis, &c.), though a complication, can scarcely, I think, be looked upon as throwing a doubt on the correctness of the diagnosis. I should mention that the tumours on the side of the neck were first noticed about a year, and the hoarseness about three months, before I saw him, and that for many months he had slept very little, owing to excruciating pains in the head. He complained of difficulty in swallowing, though he ate and drank a great deal.

In the first volume of the *London Hospital Reports* (p. 361 et seq.), Dr. Hughlings Jackson records two cases, in each of which I examined the larynx. Dr. Jackson tells me that the man, Thomas C. (CASE X. *Illustrations of Diseases of the Nervous System*), has had no further symptoms, beyond a little weakness of one leg, for a few days. The man's voice is more natural than it was.* The subject of Case XI. died. Here, although there was no paralysis of the vocal cords, the negative results of the laryngoscopic examination were thought by Dr. Hughlings Jackson to be valuable. To this point he refers in the second volume of the *Reports* (p. 330), when speaking of the symptoms of disease of the medulla oblongata. Whilst recently discussing these cases

* Still more lately I have seen this patient, and found that whilst some power has been recovered in the adductor, the right abductor has become paralysed. Owing to this condition, the patient now suffers from slight though constant stridor.

with me, Dr. Jackson reminded me of the cases of two other patients whom he had sent to me for laryngoscopic examination, on account of aphonia, with paralysis of several cranial nerves, clearly dependent on syphilis. In each case I found paralysis of one of the vocal cords, and negatived the existence of any organic change to account for the aphonia — an important matter in patients undoubtedly syphilitic. The autopsy in these cases revealed the existence of disease, involving amongst many other parts the rootlets of the spinal accessory nerves.

Bilateral Paralysis of the Abductors of the Vocal Cords (Crico-arytenoidei Postici).

Definition.—Inaction of the abductors on both sides, preventing the outward movement of the vocal cords on inspiration, and consequently giving rise to dyspnœa and stridulous breathing.

Causes.—The causes of this condition are generally cerebral, but morbid influences, which affect both pneumogastric or both recurrent nerves, may give rise to it. In a case of ex-ophthalmic goitre, in which I once saw this condition, it appeared to me doubtful whether the paralysis was caused by the direct pressure on the nerves by the enlarged thyroid gland, or whether it was due to the morbid state of the nervous system, usually present in ex-ophthalmic bronchocele. Scrofulous deposits in the bronchial and cervical glands, especially in children, are apt to give rise to it. In cancer of the œsophagus, when the deposit affects the anterior wall of that tube, both the recurrent nerves may be involved. It is, however, most commonly caused by central disease of the nervous system. The condition is fortunately very rare.

Symptoms.—With the laryngoscope the diseased condition is very apparent, for on inspiration, instead of the vocal cords being abducted from the median line, they remain nearly approximated, the opening of the glottis being in proportion to the degree of the paralysis. The aperture may vary from a line to two lines or more. In forced inspiration the opening generally becomes smaller, and in forced expiration larger;

in the former act the cords are often completely approximated. The vocal cords are often slightly congested, but they may be perfectly healthy in appearance. The voice is not generally much affected, but it may be slightly hoarse. If the patient does not move at all, the respiration may be little affected, but the least exertion brings on dyspnœa and stridulous breathing; during sleep the respiration is almost invariably accompanied with stridor. The cough is croupy. The condition is in itself apt to produce constitutional symptoms, such as wasting and febrile excitement, and it is often accompanied by paralysis of other parts, or by the cachexia of the disease, which indirectly causes it. In children it produces symptoms not unlike laryngismus stridulus, and Dr. Ley* considered that laryngismus was always of a paralytic nature, and always due to the same cause, namely, pressure on the recurrent nerves. Had the last supposition been correct, the first would have been so also; but true laryngismus depends on other causes, which operate in an opposite way.† The paralysis of the abductors of the vocal cords, which produces symptoms resembling those of laryngismus, is usually found in children of a more advanced age than those who are attacked by the ordinary form of laryngismus—that is by spasmodic laryngismus; but it may also occur to the youngest infants. It differs also inasmuch as the symptoms do not completely pass away; exacerbations may occur, but on the least exertion there is at all times stridor and dyspnœa.

Diagnosis.—Spasm of the adductors of the vocal cords produces symptoms which closely resemble those of paralysis of the abductors; in the cases of spasm, however, the vocal cords are constantly varying in the degree of adduction, whilst in the cases of paralysis, the cords are perfectly immobile. This at once differentiates the two conditions.

Pathology and Morbid Anatomy.—The disease consists essentially in a loss of power of the crico-arytenoidei postici, the powerful abductors of the vocal cords, caused by the

* *An Essay on Laryngismus Stridulus.* London, 1836.

† See *Spasmodic Approximation of the Vocal Cords.*

interception or non-generation of the nerve-current, which, through the medium of the pneumogastric and its branches, supplies these muscles in their normal state. In the case of a patient under the care of my colleague, Dr. Hughlings Jackson,* in the London Hospital, two years ago, where I had diagnosed bilateral paralysis of the abductors during life, these muscles, when examined after death, by Mr. Rivington, were found to be greatly atrophied. It is probable also, generally, atrophy of the nerve-structure.

Prognosis.—The prognosis is very serious, both on account of the immediate danger of suffocation, implied by the condition of the larynx, and on account of some serious disease either in the brain or along the trunks and branches of both pneumogastric nerves, of which the condition is an indication. The laryngeal state, indeed, is in itself highly dangerous, for though the simple action of the adductors (the abductors being paralysed) is not sufficient to close the glottis completely, the addition of a little inflammatory swelling, or œdema, would soon bring about that state.

Treatment.—The operation of tracheotomy should be performed without delay to save the patient from dying from suffocation. The opening of the trachea would be likely to exercise a favourable effect on the cerebral disease, for the indirect influence of the exceedingly narrowed glottis (through the respiratory system) must be highly injurious. Except the surgical operation, I cannot recommend any remedial treatment, either local or general. The application of electricity to the abductors would, no doubt, be an easy and perfectly rational procedure, but scarcely a safe one. When the glottis is reduced to the size of an exceedingly narrow fissure, the introduction of a foreign body to its proximity has always appeared to me to be very hazardous; reflex action of the adductors, giving rise to dangerous dyspnœa, would be exceedingly likely to occur.

The following case illustrates this form of paralysis:—

* See *Medical Times and Gazette*, vol. ii. p. 638, 1866.

CASE XVIII.—*Paralysis of the abductors of the vocal cords, of many years' standing, reducing the size of the glottis to a mere chink, not more than one-sixteenth of an inch in width.*

Judge S., aged 61, came over from America, by the advice of Dr. Marion Sims, to consult me in September, 1866, on account of shortness of breath and hoarseness. He stated that, as a young man, he had been thought to be consumptive, and, for this reason, he had for a few years abandoned his profession and taken to an agricultural life. His health improving, however, he had returned to the practice of his profession in the city. He told me that his voice had been weak for the last thirty years, but that fifteen years ago, after delivering a charge of several hours' duration, he had experienced a sudden and extreme spasm in the throat, from which, however, he recovered in a few hours. Since that time he had occasionally suffered from similar, but milder, attacks of the same sort. During the last seven or eight years, his voice had become weak, and latterly, on the least exertion, especially in talking or going upstairs, he made a great noise in his breathing. During sleep, the noise (stridor) was so loud that it disturbed people in the adjoining rooms. At meals, it often happened that "things seemed to go the wrong way," and then he had violent attacks of coughing. His symptoms had increased very much in the last five or six months, and within the last eight or nine weeks he had been troubled with a frequent, and rather prolonged, croupy cough, and slight expectoration—the latter especially occurring in the morning. As regards his family history, it appeared that an uncle and a cousin had died of consumption, but no nearer relatives had suffered from that affection. The patient now appeared weak and feeble, but being a man of enormous natural energy, he could still stand a fair amount of fatigue. He was thin, and had a palish yellow complexion, very similar to that seen in cases of malignant disease. He complained of no pain in the head or chest, nor were there any other symptoms of paralysis than those found in the larynx. On making a laryngoscopic examination, I found

that on inspiration, the vocal cords were scarcely abducted at all from the median line, the space between them not being more than one-sixteenth of an inch. In forced expiration, the opening appeared about one-eighth of an inch. In phonation, the vocal cords, which were of a pearly-white colour, seemed to approximate. The appearance is shown in the annexed cuts.

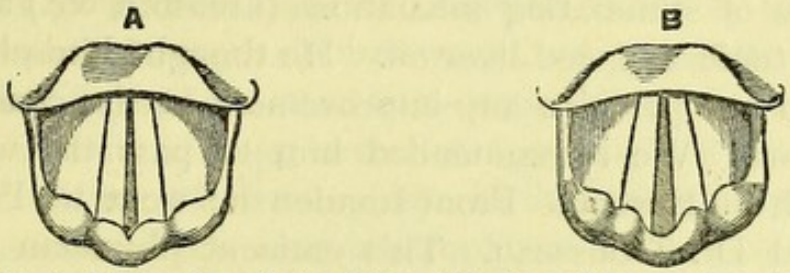


FIG. 5. Bilateral paralysis of the abductors of the vocal cords.
A Inspiration.
B Forced expiration.

I examined the chest, but could find no disease. The case being one of great gravity, I had the advantage of a consultation with Dr. Greenhow, who, after a most prolonged and searching investigation, could find nothing but some slight dulness in the posterior mediastinum. Both he and Dr. Pratt (now of Paris), a skilful laryngoscopist, verified my examination of the larynx. Wishing for still further and independent confirmation, I sent the patient to Dr. George Johnson, without making any communication to that gentleman as regards my own observations. Dr. Johnson gave a written opinion, in which he agreed with me as to the narrowing of the glottis, but differed slightly as to its cause. He expressed an opinion that the lungs were healthy.

After explaining the condition of the larynx to the gentleman, I recommended tracheotomy. He requested to be allowed to see a patient wearing a canula, and after seeing one of my patients in that condition, was unwilling to submit to the operation, saying that "he would rather have the inconvenience and danger of his present state, than the annoyance incident to wearing a canula." The fact too, which of course I explained to him, that, in all probability, he would have to continue wearing the tube as long as he

lived, strengthened his determination against the operation. Had it only been for a time, he would have submitted to it, but I could see no prospect of the paralysis ultimately yielding to treatment. He asked me to order him the necessary tracheotomy instruments, so that he could carry them about with him, and have the operation performed when he seemed in immediate danger of suffocation. Whilst in London he made use of stimulating inhalations (kreosote, &c.) and took an iron tonic and cod-liver oil. He thought himself better, but I did not perceive any improvement in the condition of the larynx. We recommended him to pass the winter in the south of Europe. From London he went to Paris, and consulted Dr. Trousseau. This eminent physician gave an opinion which, with the exception of the part referring to the larynx, differed widely from the views entertained by Dr. Greenhow and myself, and the treatment he recommended was certainly very characteristic of the French school. The following translation is an abstract of Dr. Trousseau's report:

"The laryngoscopic examination allows me to state, that the mucous membrane of the vocal cords is red and rather swollen, without ulceration.* It is equally possible to perceive that the vocal cords are, as it were, paralysed, that is to say, that they hardly move at all. I found on auscultating the chest, that in the upper part of the left lung, the respiration is weak, and I think that there exists tubercular deposit in an early condition in the upper lobe. I think that the incomplete paralysis of the vocal cords is to be accounted for by the spreading of the inflammation of the mucous membrane, and of the cellular textures, to the muscular fibres acting on the vocal cords. I prescribe as follows:—

"1st. To pass the winter at Cannes.

"2ndly. Every two months, take for a fortnight a cup of 'les Eaux Bonnes,' before eating.

* Dr. Pratt, who assisted at the laryngoscopic examination in Paris as well as in England, wrote to me that "when he inspected the larynx with Trousseau, both vocal cords were slightly tumefied, and the right one somewhat red." This was evidently an accidental and probably only a temporary catarrhal condition. He further added that "Trousseau pronounced both lungs more or less diseased, and called the laryngeal affection tuberculous."

"3rdly. The following fortnight, take in the morning and the evening, a table-spoonful of cod-liver oil.

"4thly. Keep usually in the bedroom an apparatus for the evaporation of tar.

"5thly. Every other day, inhale slowly into the trachea, eight or ten puffs of an arsenical paper cigarette.

"Paris, *Oct. 20th*, 1866. A. TROUSSEAU."

As the great physician, who differed so widely from us all, has now passed away, criticism would only recall the aphorism of the live dog and the dead lion—especially, as in this case, we had far better and more extended opportunities of arriving at a correct view. My own opinion is, that the paralysis of the abductors was due to simple atrophy of the muscles, uncomplicated by any nerve affection, but it may have been caused by peripheral disease of the recurrent nerves, or by some limited disease of the brain, involving the origin of the pneumogastric or spinal accessory nerves.

P.S.—Since writing the above, I was requested (in October, 1867) to see this gentleman in Paris. He had spent the previous winter in Italy, and was returning to London to have tracheotomy performed, when he took a slight cold in crossing the Alps, and was obliged to have the operation done at Geneva. I found a great improvement in the general condition of the patient, and there seemed to be rather more separation between the vocal cords, on inspiration. Of course he was wearing the canula.

UNILATERAL PARALYSIS OF THE ABDUCTOR OF A VOCAL CORD.

Definition.—Inaction of an abductor on one side, preventing the outward movement of the corresponding vocal cord on inspiration, and consequently giving rise to more or less dyspnœa and stridulous breathing.

Causes.—The causes which lead to paralysis of one abductor are the same as those which produce the bilateral form of paralysis; but the condition now under consideration is more often due to peripheral influences, that is to say, to pressure on one pneumogastric or one recurrent nerve. As

already remarked, aneurisms of the arch of the aorta* not unfrequently involve the left recurrent nerve, and pericarditis has been known to produce the same result.† I have also seen one case in which the abductor of the right vocal cord was paralysed, apparently from the pressure of an aneurism of the right carotid artery on the right recurrent nerve.‡ Cancerous tumours occasionally involve the pneumogastric, or its branches, and strumous glands along the trachea may do so likewise. In malignant stricture of the œsophagus, when the disease affects the anterior wall of that tube, one of the recurrent nerves is occasionally affected. The paralysis may also be due to cerebral disease. In three out of twenty-three cases of very marked hemiplegia which I was enabled through Dr. Hughlings Jackson's kindness to examine at the *Hospital for Paralysis and Epilepsy* in 1863, the abductive action of one cord was affected. In two cases the impairment of the action of the vocal cord was on the *opposite side to that on which the limbs were paralysed.* In the other case, that of Charles R., the *right arm and leg and abductor of the right vocal cord* were paralysed, and the *portio dura on the left side.*

Symptoms.—The condition can be observed with the aid of the laryngoscope, for on directing the patient to inspire, the affected cord is not drawn aside or abducted from the median line. The affected vocal cord is generally, but not always, congested. Stridulous breathing and dyspnœa ensue on the slightest exertion; but, as might be expected, not quite so severely as when both cords are affected. The voice is generally shrill. This peculiarity of the voice is probably due to a want of correspondence between the vibrations of the two vocal cords. The constitutional symptoms vary with the different conditions which give rise to this form of paralysis, but, after a time, the glottic obstruction generally causes symptoms of slight irritative fever.

* See a case which occurred in the London Hospital (*Medical Times and Gazette*, 1864) in the year 1863.

† In the interesting case (No. V.) of aphonia with pericarditis herein published the adductors of both vocal cords seem to have been affected. There is no mention of the condition of the abductors.

‡ *Medical Times and Gazette* (*Op. cit.*).

Pathological Anatomy.—The immediate nature of the disease, and the condition of the nerves and muscles, are the same as those which are found in bilateral paralysis of the abductors; but here the disease only affects one side. In the case narrated below, which I recently brought before the Pathological Society, the muscle of the affected side was seen to be completely wasted, only a few of its inner and lower fibres remaining, whilst its fellow on the opposite side was healthy and well-nourished. (See accompanying Lithograph, Plate III.) In this case the left recurrent nerve was so completely incorporated in a cancerous tumour, that its course (after entering the tumour) could not be traced.

Prognosis.—The condition is generally indicative of very serious disease elsewhere, and as a rule, an unfavourable opinion should be given as to the prospects of the case.

Treatment.—There is generally little to be done towards the cure of the disease; but tracheotomy should be performed when the symptoms are at all urgent.

In illustration of this affection I append the following cases, and must refer to others published by myself and fellow-workers (Traube, Gerhardt, Türck, Voltolini, Johnson, &c.).

CASE XIX.—*Paralysis and atrophy of the abductor of the left vocal cord, caused by pressure of a malignant tumour of the thyroid gland on the left recurrent nerve.*

Samuel K., aged 50, was sent by Mr. Richardson, of the Commercial Road, to see me at the Hospital for Diseases of the Throat, on the 10th of May, 1864. His breathing at that time was embarrassed and slightly stridulous; he had a croupy cough, and his voice was slightly hoarse. His expression was anxious, his countenance and extremities were of a somewhat purple hue; he was thin and weak. He stated that the symptoms had been coming on for six years, but had gradually become aggravated during the last few months. He had formerly suffered from constitutional syphilis. The smallest exertion now brought on a paroxysm of suffocation, and he occasionally experienced difficulty in swallowing. Twice he had spat blood, once bringing up half a pint, and

the second time nearly a pint. There were slight bronchial râles at the apices of both lungs. The heart-sounds were normal. No aneurismal bruit could be detected, nor was the arterial circulation perceptibly affected on either side of the body.

On laryngoscopic examination, it was seen that there was paralysis of the left vocal cord with central fixture, that is to say, that on inspiration the left vocal cord was not drawn outwards, but remained with its inner edge near to the median line. An opinion was at once expressed that there was paralysis of the left crico-arytenoideus posticus—the abductor of the vocal cord on that side—and that the paralysis was caused by pressure on the left recurrent nerve.

In support of the latter opinion, a few weeks later, a very slight round projection could be detected in the median line just above the sternal notch. The symptoms became gradually worse, and I sent the patient to Dr. Davies (with a description of the paralysis of the left crico-arytenoideus posticus) for a careful stethoscopic examination. Dr. Davies admitted the patient into the London Hospital, but the most careful auscultation gave negative results. He left the Hospital after a few weeks, was re-admitted several times, and finally died on the 2nd of November, 1865. During the eighteen months that the patient was under observation, all the symptoms had become greatly aggravated, and the dyspnœa had increased so much that the patient could only sleep in an arm-chair.

The tumour in the neck had become much larger, and was exceedingly hard. It appeared to be due—at least in part—to ossification of the rings of the trachea. In the last moments tracheotomy was performed by the House Surgeon; but "owing to venous hæmorrhage, the narrow space between the cricoid cartilage and the tumour, the hardness of the trachea, and difficulty of introducing the tube," the patient died almost as soon as the operation was completed.

The *post-mortem* examination showed a hard nodular cancerous tumour, two inches in breadth, reaching from the arch of the aorta to the cricoid cartilage. In its growth backwards it had first pushed the rings of the trachea before

DESCRIPTION OF PLATE I.

Illustrating a Case (No. XIX.) of Cancer of the Thyroid Gland involving the left recurrent nerve, and giving rise to paralysis and atrophy of the abductor (crico-arytenoideus posticus) of the left vocal cord.

Fig. 1 represents the tumour extending from the cricoid cartilage (*cr*) to the arch of the aorta (*a*). A vertical section has been made from the cricoid cartilage to the aorta. The tumour is seen to be of a nodular character; *x* and *z** are two prominences; two other projections are seen immediately beneath them, and a fifth behind and to the outer side of *x*. The right pneumogastric nerve (*b*) is seen giving off the right recurrent nerve (*r*), and the left recurrent nerve (*l*) is seen branching off from the left pneumogastric nerve (*c*), and passing upwards behind the aorta into the tumour.

Fig. 2. Posterior view of the cricoid and arytenoid cartilages, showing a healthy crico-arytenoideus posticus (*a*), and an atrophied condition of the left muscle—only a few of the fibres remaining at the inner and lower part (*b*); the posterior tubercle of the left arytenoid cartilage (*c*) is exposed.

Fig. 3. Microscopic appearance of tumour, from a drawing by Dr. Andrew Clark. (This specimen was brought before the Pathological Society in December, 1865, and the Report and Lithograph were published in the *Trans. Path. Soc.*, vol. xvii. p. 30.)

* A slice has been taken from *z* to show the microscopic structure in Fig. 3.

FIG. 1.

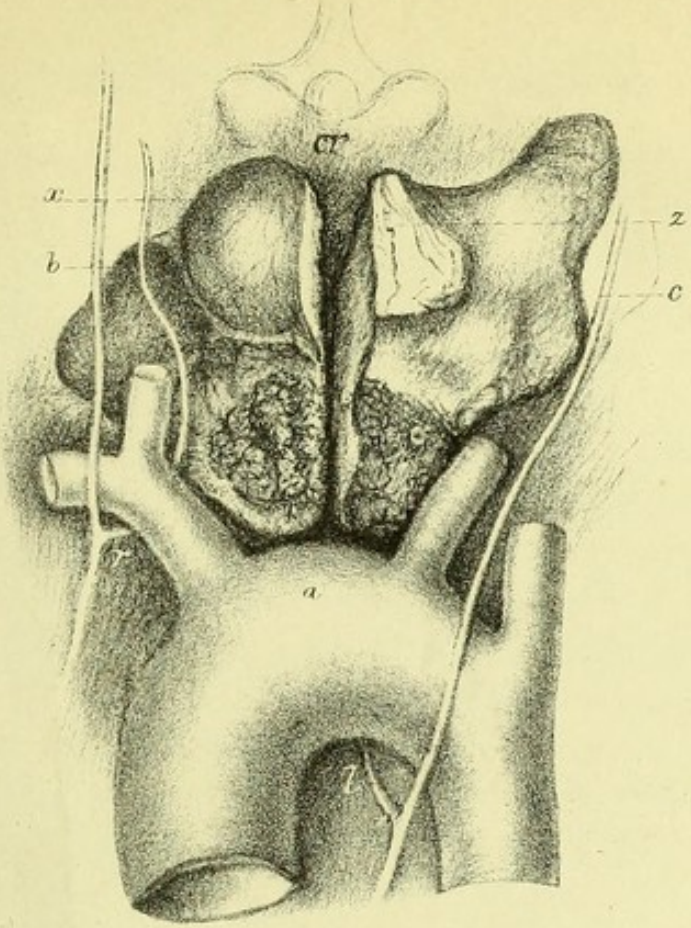


FIG 2.

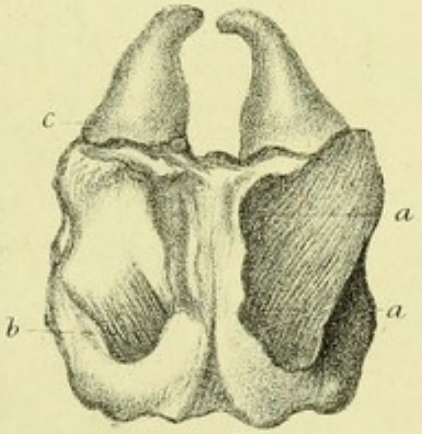
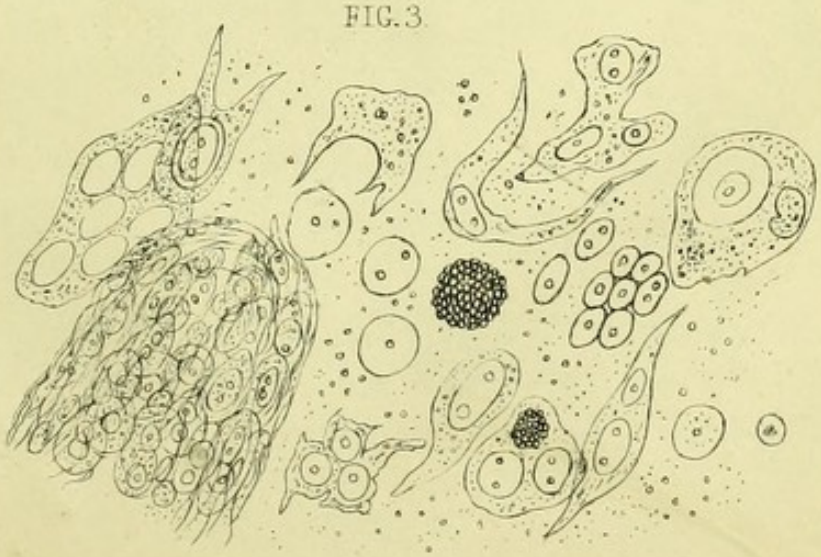


FIG. 3.



E. Burgess lith.

W. West imp.

it, so that they were within a quarter of an inch of the posterior wall of the trachea, and then had burst forth beyond and formed an oblong tumour, about half an inch in width, which extended rather obliquely down the trachea for an inch and a quarter, from just below its second ring. The calibre of the trachea at this part was diminished to the eighth part of an inch. In its growth the tumour had pushed through the left wall of the trachea, and just penetrated into the canal of the œsophagus. The tumour had completely incorporated the left recurrent nerve, just where it passes up from beneath the upper border of the arch of the aorta. (See Plate I., fig. 1.) The left crico-arytenoideus posticus was completely atrophied, only a few pale thin fibres could be seen at its lower and inner part (Plate I., fig. 2*b*), whilst its fellow was large and well nourished (Plate I., fig. 2*a*).

The following report and the microscopic drawing (Plate I., fig. 3) were kindly furnished by Dr. Andrew Clark:—"The disease appears to have begun in the thyroid gland, and to have been at first nothing more than a sort of hypertrophy, with the production of colloid matter. Next there seems to have been lymph effused in the centre and back part of the gland, which has undergone cretaceous transformation. The disease seems to have broken through into the trachea, and finally to have reached the œsophagus. In the air-tube it seems to have assumed a new character. In the obscurely villous growth at this part, I find nests of free vesicular nuclei, and here and there areolæ filled with variously shaped tumid cells, containing multiple vesicular nuclei and vacuoles. I consider the growth to be a rudimentary cancer." Cancerous deposits were found in the liver and lungs.

CASE XX.—*Paralysis of the abductor of the left vocal cord, caused by aneurism of the arch of the aorta, pressing on the left recurrent nerve.*

Thomas D., aged 30, well nourished, and of considerable muscular development, but having a large arcus senilis in both eyes, applied at the London Hospital, December 1st,

1863, on account of a burning pain in the chest. On inquiry it was found that he had several times lately spat up a few teaspoonfuls of blood, altogether about a cupful. His appetite was good, and there was nothing to indicate disease of the digestive system. A careful examination of the chest failed to detect any signs of venous obstruction (from pressure on the large trunks).

The pain had come on quite suddenly about a fortnight before he came under notice, and he compared it to a feeling "as though he had swallowed something too hot." At the time that he first felt the pain, his voice suddenly became very hoarse and weak, and it has since become shrill and feeble. He continued his work for a day or two after he first felt the "burning," but his occupation (that of a dock-labourer) aggravated the pain so much, whilst it caused him at the same time to make "a crowing noise in his throat," that he was obliged to desist from all labour.

The following is a report of my laryngoscopic examination :—

"The larynx is quite free from structural disease, and there is not the slightest congestion of the mucous membrane. On inspiration, there is a very slight difference in the position of the vocal cords,—the left being a little nearer to the median line than the right. On the left side also, the capitulum Santorini is a little nearer to the median line, and on a rather higher level than its fellow, and the same observation applies to the left aryteno-epiglottidean fold and its contained cartilage. This condition of the left side of the larynx is not so marked as in other cases of unilateral spasm* of a vocal cord that have come under my notice; but it must be observed that, in this instance, neither of the vocal cords is so much drawn aside in inspiration, as is commonly the case: this fact would account for relative

* Before I had given much attention to the pathology of the muscular apparatus of the larynx, I employed the term "spasm" to describe those cases in which the vocal cord was not abducted in inspiration. The sharp voice and stridulous breathing have misled many observers, and pressure on the pneumogastric or its branches is even now constantly described as giving rise, first to spasm, and then to paralysis.

DESCRIPTION OF PLATE II.

Illustrating a Case (No. XX.) of Aneurism of the Arch of the Aorta, involving the left recurrent nerve, and giving rise to paralysis of the abductor of the left vocal cord.

Fig. 1 represents the posterior view of the windpipe and aorta; *a* is the ascending aorta, *a'* the descending aorta; the left pneumogastric nerve (*b*) is seen passing down in front of the aorta, and (at *b*) giving off two branches, one of which goes to the left bronchus, whilst the other (the recurrent) passing upwards, gets incorporated in the aneurism, and is lost in it (at *c*). A *post-mortem* opening has been made at *o*. The right pneumogastric nerve (*r*) and the right recurrent (*d*) are also visible. The abductor of the right vocal cord [crico-arytenoideus posticus] (*x*) is normal and well nourished, whilst the left muscle (*z*) is pale and greatly atrophied. The aneurism is seen to push the trachea on one side, and to encroach greatly on the canal (at *p*).

Fig. 2. Anterior view of aorta, with a portion of trachea and bronchi; an accidental rent has been made at (*s*). The other letters are the same as in Fig. 1.

Plate 2.

FIG. 1.

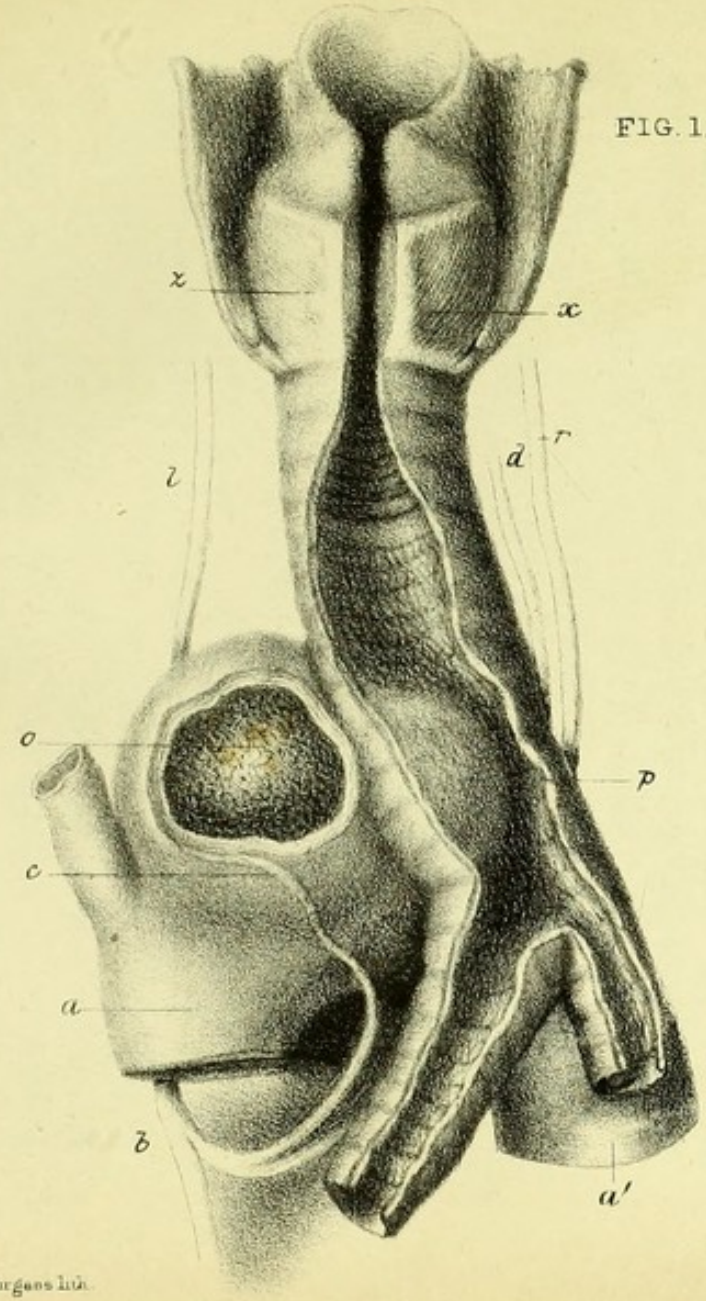
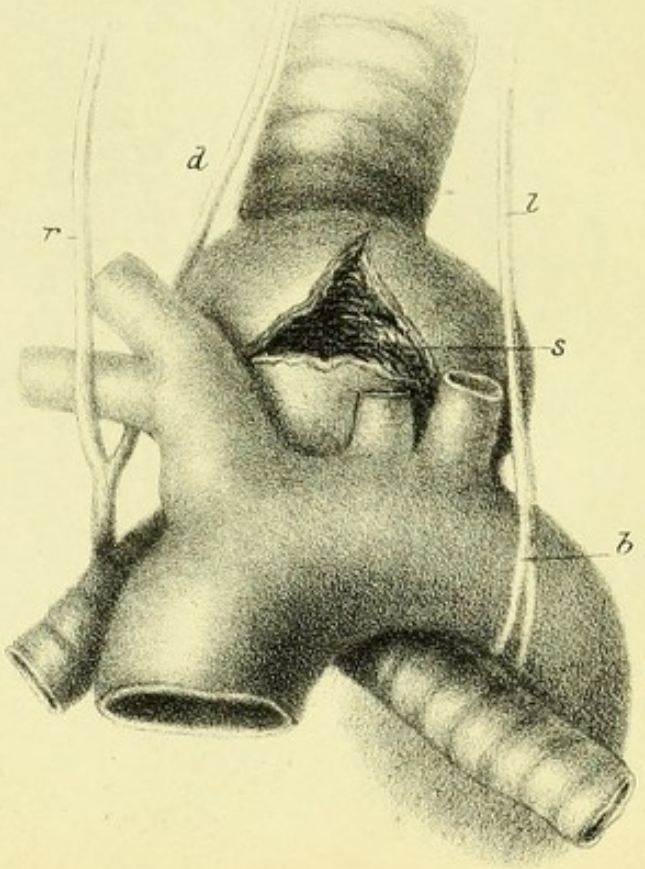


FIG. 2.



E.E. Burgess lith.

W. West imp.

differences between the two sides, being less marked than is usual. On gentle phonation, the left vocal cord is seen to remain fixed, whilst the right advances well to the median line: a small space remains between the vocal cords. On forced phonation, the right vocal cord crosses over the middle line, so that its inner edge touches the left cord. When the vocal cords are approximated in this way, the whole of the right cord, but only about one-third of the breadth of the left cord, can be seen. It was carefully noted that this appearance was not due to any difference in the size of the false cords,—that is to say, the left true cord was not eclipsed by the false cord on the same side." The patient could only speak in a high-pitched squeaking voice, of a somewhat *falsetto* character.

The patient left the Hospital at the beginning of 1864, and died after a painful paroxysm of angina pectoris on March 3rd. A *post-mortem* was made twelve hours after death, by Dr. Powell, the resident medical officer, and Mr. Frederick Mackenzie. The following is an abstract of the report:—

At the upper part of the arch of the aorta was an aneurismal sac, about the size of an unpeeled walnut, containing laminated fibrine. Its position and relations were as follows:—It was situated partly on the anterior surface of the trachea, but its principal bulk lay to the left side of that tube. The anterior, upper, and posterior portions of the transverse part of the arch of the aorta were involved in the tumour. The innominate artery was pushed forwards, and compressed by the tumour, which extended half an inch to the right of that vessel, but did not involve it, though the margin of the sac was only distant a quarter of an inch from its origin. The left carotid and left subclavian were neither involved nor compressed, and bounded the sac in their usual position. The left recurrent nerve was traced from its origin from the vagus, round the arch of the aorta, as far as the sac of the aneurism, with which it became incorporated, and could not be followed further. The sac of the aneurism encroached upon the left side of the trachea and anterior surface of the œsophagus. On slitting up the trachea along

its posterior part, a projection, an inch and a half long, by three-quarters broad, was evident on the left side of that tube, just above its bifurcation, and extending to within a quarter of an inch of the opposite side. The mucous membrane covering it was dark and congested, and there were appearances of commencing ulceration. The cartilaginous ring in this situation had also undergone partial absorption.

On removing the mucous membrane from the posterior surface of the cricoid cartilage, it was found that the left posterior crico-arytenoid muscle was completely atrophied—only a very few thin pale fibres being apparent. The right muscle was large and healthy. The difference between the two sides is seen in the annexed Lithograph (Plate 2), taken from the specimen, which is in my possession. The œsophagus was opened, but presented nothing remarkable. The aneurism was of the false variety. (For a more detailed report, see *Medical Times and Gazette*, 1864, vol. i., pp. 34 and 643. At the time the *post-mortem* was originally published, the intrinsic laryngeal muscles had not been dissected.)

Paralysis of the Tensors of the Vocal Cords (Crico-thyroidei).

The paralysis of the tensors and laxors might be subdivided into bi-lateral and uni-lateral paralysis, as it not unfrequently happens that one side only is affected. As, however, the ætiology, pathology, and treatment are the same whether one or both sides are affected, it simplifies the subject in this case to avoid subdivision.

Definition.—Feeble action of the tensors, the result of which is, that the vocal cords not being properly stretched, the voice is lost or muffled, or the higher notes more or less suppressed, and vocalization is attended with a sense of fatigue, or even pain.

Causes.—The most common cause is a too violent or a too prolonged use of the voice; and, of course, when these two causes operate together, they are exceedingly likely to bring about the condition now under consideration. I have met

with it amongst military men (from giving the word of command), often amongst the clergy; twice I have treated auctioneers for it, and I have frequently met with it amongst singers and actors; but I have never known a barrister to be thus affected. I have several times seen it in the case of young girls learning to sing, and two or three times boys, who had previously sung *alto* in choirs, have been brought to me on account of it. It very frequently arises from people singing when they have colds, or when the body is exhausted. On the other hand, it not unfrequently occurs to people who are not in the habit of using their voices, except in ordinary conversation. I have seen one case in which it was caused by a severe blow.

Symptoms.—The laryngoscopic signs are not so evident as in the paralysis already described. There are, however, three points by which it may be perceived; viz. (1), the surface of the vocal cords; (2), the edge of the vocal cords; and (3), the *processus vocalis.* (1.) It can generally be seen that the surface of the vocal cords is not perfectly horizontal—that in fact, in quiet respiration, there is a slight depression or elevation near the centre of the vocal cord, according as the breath is inspired or expired. In whispering the letter "*e*," the elevation of the central portion of the vocal cord can be most easily perceived. (2.) When the disease is very marked, the edges of the vocal cords can sometimes be seen to be distinctly waved in such a manner, that, taking the anterior insertion of the vocal cord as one point, and its posterior extremity as the other, the edge of the vocal cord does not pass in a direct line between them, but has a more or less sinuous course. (3.) The processus vocalis can never be seen with the aid of the laryngoscope, when the tensors are paralysed. This, however, though a confirmative symptom, is not in itself diagnostic, as the extent to which it is apparent depends on its natural development, and on the thickness of the mucous membrane. It not unfrequently happens that, in these cases, the abductive action of the vocal cords is slightly at fault. The cords do not remain near the median line; but they are not drawn aside so completely as in the

normal state. The latter peculiarity is especially seen in the posterior third. The vocal cords do not commonly present the pearly-white colour of health, being often of a dirty-grey colour; they are not generally much congested. As regards the general symptoms, the character of the vocal affection has been already, to some extent, considered in giving a definition of the disease. It is seldom that the voice is completely lost, and sometimes the ordinary speaking voice is not affected, whilst the singing or preaching voice is very much at fault. Fatigue after, or whilst speaking, is one of the most common symptoms.

Pathology.—The condition is invariably of a so-called functional character—that is to say, it depends on weakness, or a strain of the crico-thyroid and posterior crico-arytenoid muscles. The former are no doubt the principal tensors of the vocal cords; but complete tension can only occur when the abductors act to a slight extent.

Prognosis.—The affection is not in itself dangerous, and usually yields without much obstinacy to suitable remedies.

Treatment.—In these cases I have found the best results from the use of electricity. As the external muscles (crico-thyroid) are here principally affected, the current can be applied to them without any difficulty. Still the cure has generally appeared to be expedited by the application of the current to the posterior surface of the cricoid cartilages, that is, to the abductors of the cords. In these cases counter-irritation (blistering, &c.) often effects a rapid cure, especially when the disease is uni-lateral and the blister is applied over the affected muscle. I have likewise known very good effects result from the persevering use of stimulating liniments, and from frictions of the skin. The following two cases illustrate this affection :—

CASE XXI.—*Loss of voice of three years' standing, from paralysis of the tensors, cured by eight applications of electricity to the vocal cords.*

Miss Kate H., aged 26, consulted me in March, 1863, for loss of voice. The young lady was delicate-looking, but did

not complain of weakness. She was of a cheerful disposition, and did not appear in the least degree hysterical. She informed me that in April, 1860, she took cold, had an ulcerated sore-throat, and lost her voice. She afterwards wrote me a more detailed account of her aphonia, which I shall give, as far as possible, in her own words. "After recovery from the sore-throat, the voice did not return; and in October, 1860, her regular medical attendant applied caustic twice to the throat, but without any effect." She then consulted some of the leading London physicians, and, among others, Dr. Walshe, who clearly recognised the nervous character of the disease, and "recommended galvanism to be applied, first by one of Pulvermacher's chains, and afterwards, if that did not succeed, by means of a battery. Neither produced any effect." This distinguished physician then "strongly urged her to leave it to nature, which she did till April, 1862, when she had the throat painted with iodine, with no other result than making it very sore on the outside." In May another eminent physician prescribed "zinc pills, which were taken three times a day for a month, without any result. In June, 1862, Dr. Blandford met Dr. Czermak, to examine the throat with the laryngoscope. Galvanic shocks were strongly advised;" and in the following November Miss H. placed herself under a physician who has paid especial attention to medical electricity. "He applied galvanism every day with a metallic brush, and afterwards in a stronger form for a fortnight. All this time there was not the least return of the voice."

Miss H. applied to me in March, 1863; and, in making a laryngoscopic examination, the vocal cords were seen to be very pale and narrow. On attempted phonation, they approximated well, but still were distinctly relaxed; and the upward bulging towards their centres was quite perceptible.

I at once applied electricity to the cords by means of my "laryngeal electrode." The operation was repeated every two or three days, and after the fourth application of the electro-magnetic current, the voice returned. It was very gruff at first, and "came and went;" so that, though the

young lady recovered her voice one evening, when she came to tell me of her good fortune the next day, she was unable to produce a sound. Gradually the voice became more constant, though its monotony was very striking; every syllable and every sentence was pronounced in the same tone, with an entire absence of expression. After electricity had been applied altogether eight times, the voice was completely restored, and perfect as regards modulation. The laryngoscopic evidence of relaxation of the cords disappeared after the third application of electricity.

Many people would consider this case an example of hysterical aphonia, but I must again repeat that the patient never showed a single hysterical symptom. Being anxious to investigate the case thoroughly, I wrote to Dr. Alfred J. Tapson (of Gloucester Gardens), the regular professional adviser of the young lady, and he kindly replied as follows:—

"Miss Kate H. has been a patient of mine for a good many years, and I well recollect her illness in 1860. She suffered from intense headache, a remarkably quick pulse, and total loss of appetite, attended with great prostration, emaciation, and loss of voice. *She had no hysterical symptoms.* Dr. Todd saw her several times, and was quite puzzled what to make of her symptoms. We both had some suspicions that she might be going to have tubercle in the brain or elsewhere. She gradually recovered her health and strength, but never her voice (though I and many others tried all we could think of). She gave everything a fair trial, being most anxious to regain her voice."

I have entered somewhat minutely into the history of this case, because I was anxious to show that it was entirely free from hysteria, and that the aphonia was dependent on profound disturbance of the nervous system. There were, as Dr. Tapson says, "intense headache, a remarkably quick pulse, and total loss of appetite, with great prostration and emaciation." It is scarcely necessary to observe that such symptoms imply impaired innervation of the most extreme form.

Electricity was clearly indicated in this case. Dr. Walshe

from general investigation, and Dr. Czermak, from special examination of the larynx, both recommended electricity. External electricity was vigorously employed by an experienced galvanist, "without the least return of the voice." Electricity applied directly to the vocal cords succeeded rapidly in restoring the voice, which had been completely lost for three years. No comment on the superiority of the internal method of employing electricity is required.

CASE XXII.—*Aphonia of five months' standing in a child ten years old (from paralysis of the tensors of the vocal cords) cured by one application of electricity to the vocal cords.*

Miss Gertrude S., a pretty child, aged 10, suffering from loss of voice, but otherwise healthy, was brought to me, on August 27th, 1863, by Mr. Taylor, of Guildford. Mr. Taylor gave the following account of the little patient's aphonia. He was called to see her in March, when he found her sitting up in bed, and breathing excessively quickly. The physical signs did not at all explain the rapid respiration; and he was struck with its remarkably nervous character. An attack of bronchitis, in which the nervous symptoms predominated, afterwards developed itself, and on recovery it was noticed that the child had lost its voice. Various tonics were tried in vain, and change of air to Brighton (where a laryngoscopic examination was made by Dr. Ormerod) failed to restore the voice.

Finding that the larynx was quite healthy, with the exception of a relaxed state of the vocal cords, in the presence of Mr. Taylor I applied electricity to the vocal cords. The voice was then and there perfectly restored, and when the little girl left me, she was able to speak in her natural voice.

This case is very interesting from its occurring to so young a subject.

CASE XXIII.—*Dysphonia of two months' duration, from paralysis of the tensors, cured by counter-irritation.*

Captain S., aged 39, of Portsmouth, visited me in October, 1865, on account of weakness of voice, which came on

suddenly, after exerting his voice for some time on parade. Before going on the drill-ground, he had been taking part in a swimming match, and was much fatigued. This was in the month of August. The voice was completely lost at the time, but the next day he recovered "a thick kind of voice." Since then there had been no improvement in his voice, though he had taken tonics and used a wet compress round the throat at night. On making a laryngoscopic examination, both vocal cords were seen to be much related; the larynx was otherwise healthy. The characteristic waved outline of the free edge of the cords is shown in the annexed cut.

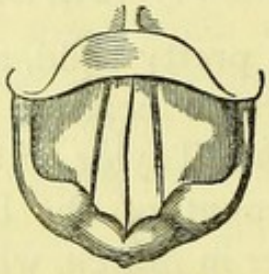


FIG. 6. Vocalization. Paralysis of the tensors of the cords.

As the patient was unable to stay in London, I ordered a blister (four inches by one and a half) to be applied round the neck—marking the situation of the crico-thyroid muscles myself with nitrate of silver. I also advised that the sore should be kept open with savine ointment, and prescribed a mixture containing citrate of iron and quinine. After three weeks the voice was so much improved that the blistered surface was allowed to heal. At the end of November the patient called on me in passing through town, to say that he was quite well.

CASE XXIV.—*Dysphonia of five months' duration, from paralysis of the tensor of the right vocal cord, cured by electrisation of the affected muscle.*

Mr. E. M., aged 44, an auctioneer, consulted me in February of the present year, on account of weakness of voice, which had been coming on for five months. He had tried various modes of treatment, and had lately been using an atomized solution of iron. He stated that he seemed to get better, and then worse again; but that, on the whole, he was

in about the same condition as in the previous November. His general health was far from good, and he was in a very depressed state about himself.

On making a laryngoscopic examination, the right vocal cord was seen to be much relaxed. On applying a current through the right tensor, whilst the laryngeal mirror was *in situ*, the effect on the corresponding vocal cord was very evident. This patient continued the treatment himself (with a little American apparatus), applying the current two or three times a day for a month. At the end of that time he stated he was completely cured, and the right vocal cord certainly showed no signs of relaxation.

Paralysis of the Laxors of the Vocal Cords (Thyro-arytenoidei).

Definition.—Feeble action of the laxors; the result of which is, that (the tensors not being properly antagonized) the formation of the lower notes is interfered with, and the pitch of the voice is raised.

Causes.—The causes are, to a great extent, similar to those which give rise to paralysis of the tensors; but this condition more often arises from the too prolonged than the too violently used muscles; that is to say, more often from over-fatigued than strained muscles. The latter cause seems, however, to have operated in Case XXV., reported below. The condition is sometimes congenital; or rather, though there is probably no paralysis of the laxors, the tensors have a too great relative power.

Symptoms.—With the laryngoscope, the vocal cords may be seen to be unusually elongated, but this is not always evident. A very minute elliptical opening between the vocal cords (corresponding to their middle third), is more often to be observed in phonation, and the tense condition of the cords often throws a shadow towards the ventricular orifice, which makes this opening appear larger than in the normal condition. This elliptical opening is only to be seen when both vocal cords are affected. When the laxor of only one cord is affected, only one half of the ellipse is to be seen,

and the arytenoid cartilage on the same side appears rather in advance of its fellow. The vocal cords are generally slightly congested. The voice is shrill and grating.

Diagnosis.—It is very important to note whether the elliptical opening varies much in form. If very evident one moment, and the next not to be seen at all, it is due to spasm of the tensors, and belongs to quite a different class of affections to that now under consideration. When due to paralysis of the laxors, the shape in phonation does not vary at all, or only very slightly.

Pathology.—The affection is probably more muscular than nervous, due in fact to exhaustion of the ultimate sarcous elements. When congenital, the condition is incurable.

Prognosis.—These cases are generally obstinate, but ultimately yield to suitable treatment. The condition is not in itself dangerous or a sign of danger.

Treatment.—There are two curative elements, both of which are often of great service in these cases; the one is rest—complete rest for the vocal organ, the other the local application of electricity. When the case is a slight one, rest—that is, silence—often effects a cure, but where the patient has continued to use the voice to any extent after the symptoms had begun to show themselves, more positive treatment is required. The local electrisation generally has to be continued over a longer period than in paralysis of the tensors.

CASE XXV.—*Dysphonia of four months' standing, from paralysis of the laxors cured by the direct electrisation of the vocal cords.*

The Rev. W. C., aged 25, consulted me at the end of May, 1867, on account of weakness of voice, which had been coming on for the last five months. He attributed the affection to over-use of the voice: it had come on after a week of unusually severe work. He had only been ordained eight months, and "feared that he would be obliged to give up the public duties of the Church." He particularly noticed that his voice was not only weak, but altered in character; appearing sharp and disagreeable to himself. His general health

had not been good for the last eight years, for in 1859 he had suffered from a severe attack of rheumatic fever, and since then had been more or less constantly subject to rheumatic pains.

On making a laryngoscopic examination, the characteristic elliptical opening was seen between the vocal cords. The surface of the cords was healthy, as was also the rest of the larynx. The appearance is shown in the annexed cut :—

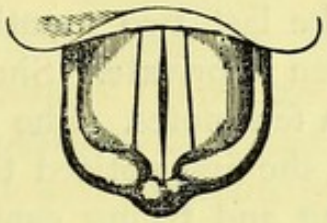


FIG. 7. Phonation. Paralysis of the laxors.

He had not had any specific local treatment, but had been told by a physician that the affection was rheumatic, and had taken lithia-water twice a day for a month. No improvement had taken place in the voice. I advised him to give up work altogether—as he was engaged as curate in a very large suburban parish—and to try the effect of direct electrisation of the vocal cords. The electricity was applied every day for a fortnight, and afterwards less frequently. The voice soon became so improved in character that by the end of June the patient was able to resume work. This time, by my advice, he has found a church to officiate in which only holds two or three hundred people.

The typically illustrative cases which have been recorded under the last two sections are very rare, and I have had a few others equally uncomplicated. Most commonly both the laxors and tensors are affected at the same time, so that all the notes, or nearly all the notes, are impaired. The cords too are generally congested.

The rule I adopt is first to relieve the congestion by the local application of mineral astringents ; then, if the voice is not restored, to apply electricity, giving particular attention to the muscles most affected.

CASE XXVI.—*Dysphonia of a year's duration from paralysis of the laxors of the right vocal cord, cured by electricity.*

Madame C., aged 34, a professional singer, consulted me in May, 1865, on account of a difficulty she had experienced during the last year in forming her lower notes. Her voice in the ordinary way extended from *d* above the line to *a* below. A year ago she first experienced slight difficulty in forming the lower *a*, and in January she could not reach beyond *b*. During the last two months she had not been able to sing at all, even in private. She broke down directly she attempted even a few notes. She attributed the loss of power to a strain, as she first noticed the difficulty after the performance of a long and trying cantata, which had been twice encored. At the time she had experienced "a stinging sensation, extending from the right side of the throat up towards the ear."

She had been constantly under treatment since her voice first became affected. "The only thing which had seemed to do her good was a solution of caustic applied to the throat with a piece of sponge at the end of a whalebone rod." But though this treatment always gave temporary relief, there was no permanent improvement. On making a laryngoscopic examination, the parallelism between the vocal cords was seen to be lost, the right cord curving away in the centre from the median line.

The treatment (direct electrisation of the right vocal cord) was long and tedious in this case. At the end of six weeks there did not appear to be any improvement, and I should have given it up had not the patient most earnestly begged of me to continue a little longer. I was glad that I did so, for a fortnight later the patient perceived a marked improvement in the voice. In order to test the voice, I used to allow the patient to sing a few notes once a week, but at no other time. At the end of three months the voice was decidedly improved, and the following autumn the voice was so completely restored that the lady was able to accept an engagement in Madrid.

Spasm of the Adductors (or Spasmodic Approximation) of the Vocal Cords.*

Definition.—Spasmodic action of the adductors, causing more or less complete (but temporary) approximation of the cords, and giving rise to paroxysms of dyspnœa and stridulous breathing.

Synonyms.—*Latin:* laryngismus stridulus, laryngitis stridula, spasmus glottidis, cynanche stridula, cynanche trachealis spasmodica, asthma koppii, asthma millari, asthma intermittens infantum, asthma thymicum. *French:* laryngite striduleuse, faux croup, pseudo croup nerveux, spasme de la glotte. *German:* Kehlkopf-krampf, Stimmritzen-krampf, Cerebral-croup, Pseudo-croup. *English:* Miller's asthma, crowing inspiration, child-crowing, spasm of the glottis, spasmodic croup, spurious croup, cerebral croup, &c. &c.

Causes.—The causes of spasm of the vocal cords are involved in a considerable amount of obscurity, and there is evidence to show that many influences may be concerned in its production: hence it is not surprising that the ætiological views concerning it should have undergone various changes and modifications. The causes may be divided into (1) central, and (2) peripheral; the latter being subdivided into (*a*) direct, and (*b*) reflex.

(1). The disease was at one time considered to be always dependent on cerebral disease, or at least on a disordered state of the functions of the brain,† and this view, which has been assailed in various ways, seems to be again gaining ground. Numerous cases are on record, where other admitted symptoms of cerebral disease manifested themselves before the occurrence of laryngeal spasm. Limited congestion, or interstitial exudation of a serous fluid, near the organ of the pneumogastric or spinal accessory nerves, are pro-

* In hooping-cough, the essential phenomena of the disease is that of spasm of the adductors of the vocal cords, but the limits of this article prevent my touching on that complaint.

† *Commentaries on Diseases of Children*, by Dr. John Clarke, 1815.

bably the conditions of the brain concerned in the production of this phenomenon. In many cases, however, the structural alteration of the brain, if present, is of too delicate a nature for detection, and still more frequently a morbid condition of that organ is produced by the sudden apnœa which occurs. Hence, even when the brain is the primary seat of the disease, it is impossible to speak with certainty as to the nature of the morbid condition. The cerebral affection is probably often dependent on a dyscrasic state.

A rachitic condition of the bones of the skull has frequently been noticed. Out of ninety-six cases of laryngismus examined by Lederer, there was craniotabes in ninety-two.* The experience of Drs. Jenner and Wiltshire is of a similar character.† It has been suggested that the thinness of the cranial bones in rickets allows pressure to be exercised on the brain in the occipital region, when the child lies on its back (Elsässer); but it is more probable that the rachitic dyscrasia is accompanied by morbid changes of a nutritive character in the structure of the brain itself.

Scrofula has also been regarded as an active predisposing cause of the disease (Marsh). Sometimes an attack is brought on by tossing the child in the air, and it still more often comes on in sleep. These facts have been adduced by some as an evidence of the cerebral nature of the disease; but it must be remembered that both in sleep and in sudden movements of the body the function of respiration, not less than the cerebral circulation, is modified, and that the spasm of the glottis may originate in either process. Disease of the cervical portion of the spinal cord sometimes gives rise to it (Marshall Hall). In cases of disease of the brain or medulla, external pressure applied over these parts has been known to cause laryngismus. Hydrocephalus exists in some cases; and mental emotion, especially terror and rage, occasionally give rise to the spasm.

(2.) *a.* Direct pressure on the recurrent or pneumogastric nerves, by enlarged and tuberculous cervical or bronchial

† Rühle, *Kehlkopfkrankheiten*, p. 201. Berlin, 1861.

‡ See Art. "Rickets," Russell Reynolds' *System of Medicine*, vol. i. p. 786.

glands, has since Dr. Ley's time been regarded as a cause of laryngismus; but in these cases the cause is probably (as Dr. Ley conceived) "paralysis of the dilators of the glottis." At one time, especially in Germany, enlargement of the thymus gland was considered the essential cause of laryngismus, but its influence is now considered to be of a very exceptional character. In so far as these causes operate by producing paralysis of the abductors of the vocal cords, they belong to the last section of neuroses, but they probably often cause spasm of the adductors, by obstructing the venous circulation through the neck, and thus giving rise to cerebral irritation. In the case (No. XXVII.) now recorded, the right recurrent was pressed upon by a strumous bronchial gland, but I was unable to determine what relation that condition had to laryngismus.

b. Amongst the reflex causes of spasm, we have those acting directly on the larynx, and those operating at a distance. Attacks not unfrequently come on whilst the child is sucking, or rather swallowing, and there can be little doubt that the cause here is the passage of liquid into the larynx. Spasm produced by "dangling" the child in the air is probably caused by the impression of a current of air on the glottis. Amongst the reflex causes of laryngismus which act at a distance, there are the irritation of teething, the presence of indigestible food or parasites in the alimentary canal, and the impression of currents of cold air on the integuments. It sometimes supervenes on the cure of a protracted diarrhœa, or a chronic skin affection; but these causes probably act by setting up cerebral irritation. It has been noticed by Sir William Jenner, that the mother's health has an important influence in the production of rickets, and Kopp* has made precisely the same observation with regard to laryngismus. Here then is another link in the chain of association which Dr. Jenner has sought to establish between these two morbid conditions. The greater liability of the male sex, which occurs in other laryngeal diseases, holds good here. The disease is most frequent between the ages of six months and two years.

* Kopp, *Denkwürd. in der ärzt. Prax.* Frank. 1820.

The causes already referred to apply principally to children, but symptoms of an analogous character are occasionally met with in adults. Here the cause is generally involved in obscurity. It may, however, result from some irritation in the neighbourhood of the glottis, it may be of an hysterical character, or it may occur as a sequel to hooping-cough. I have frequently met with cases of the last kind; so lately as last April, Mr. Francis Corner sent me a gentleman (Mr. W. S., aged 30) where the spasmodic action of the adductors was evidently due to this cause. A case, in which the symptoms were caused by congestion of parts adjacent to the vocal cords, was in the London Hospital in 1862;* and hysterical cases are by no means unfrequent. There are others, however, to which no probable cause can be assigned.

Symptoms.—The symptoms are so different in many respects, as regards children and adults, that it is best to consider them separately. In *children* the age of the patient destroys the value of subjective symptoms; but those of an objective character are sufficiently marked. The following is the common history of a first attack. A child put to bed, apparently in its ordinary state of health, wakes up suddenly at about midnight with difficulty of breathing, inspiration being accompanied by a crowing noise similar to that heard in croup. After two or three of these stridulous inspirations, the frightened child bursts out crying, and in a few minutes is fast asleep again as if nothing had occurred. This description does not apply to every case. The child may have been peevish and fretful for a few days before—may have suffered from loss of appetite, and may have been restless at night, or a slight "catch" in the breath may have been previously noticed. The first attack may come on at any other time; but it most frequently occurs during sleep. The next day the child may be quite well, and there may be no further return of the symptoms; but it often happens that another attack comes on about the same hour the following night. The second attack is generally more severe than the first, both in its character and duration. In severe cases, indeed,

* *Medical Times and Gazette*, Nov. 15, 1862.

the paroxysms are of a most urgent kind, and of the most frequent occurrence. A severe fit of laryngismus may be thus described: the breathing suddenly becomes greatly embarrassed, each act of inspiration being much prolonged and accompanied by a harsh stridor; suddenly the sound ceases, the glottis is completely closed, and the respiratory movements of the chest are suspended. The flush, which first lit up the countenance, gives way to pallor, and afterwards to lividity. The eyeballs roll, the veins of the neck are turgid, the fingers close on the thumb, which is bent in the palm, and the hands are flexed on the wrist; spasm likewise affects the heel, the great toe is drawn away from the other toes, and the foot is flexed and rotated slightly outwards. These so-called "carpo-pedal" contractions are probably sometimes accompanied with great pain. The disease, indeed, may partake of the character, and assume the form of epilepsy. Notwithstanding the severity of the paroxysm just described, the patient may survive it, the apnœa being succeeded by stridulous breathing, and by relaxation of the spasmodic contractions of the feet and hands; but when the symptoms are of the dangerous character just described, the paroxysm is almost sure to be quickly followed by others—in one of which the child dies. The severity of the attacks varies between the mild paroxysm, which has been described as occurring at the commencement of the disease, and one sufficiently intense to cause death. The spasm is characterized by its sudden occurrence, by its complete remission, generally by the entire absence of febrile irritation, and by the progressive severity of the spasm, as regards recurrence, duration, and intensity. Some of the associated symptoms of laryngismus may likewise be present, such as hydrocephalus, a rachitic condition, or enlargement of the thymus body.

In *adults*, on the other hand, the symptoms are generally more immediately confined to the larynx and respiratory process. The dyspnœa and stridor are often very great, and there are all the signs of impeded respiration—lividity of countenance, dilated nostrils, protruding eyeballs, &c.; but I

have never met with a case in which there was anything approaching to carpo-pedal contractions. In adults also the remission is not so complete as in the case of children, and there is more often some congestion with secretion—occasionally to a considerable extent. With the laryngoscope the vocal cords can be seen on inspiration to be spasmodically approximated. They may separate widely; but instead of remaining apart for a few seconds, they are instantly and spasmodically adducted to the median line, or even beyond it, that is, against one another. Often, in these cases, there is also excessive tension of the vocal cords. Sometimes the closure of the glottis is immediately followed by the spasmodic approximation of the ventricular bands (false vocal cords). In this case the view of the vocal cords is at once occluded. The surface of the larynx may appear perfectly healthy, or there may be more or less congestion of the mucous membrane; sometimes the vocal cords appear perfectly healthy, whilst the rest of the membrane is hyperæmic.

Diagnosis.—In children the non-febrile and distinctly intermittent nature of the affection differentiates it from true croup, and its own distinctive character from all other diseases. In adults, in addition to the other symptoms, we have the laryngoscopic signs. It is important to note the laryngoscopic difference between spasm of the adductors and paralysis of the abductors. In the paralytic cases the closure of the glottis is more constant, but not nearly so complete, and the vocal cords are never abducted from their paralyzed position: in spasm of the adductors, on the other hand, there is continual movement of the cords, and they are often momentarily widely separated.

Pathology.—The pathology of the disease has been considerably encroached upon in considering its causes; but there still remains something to be said concerning its nature. In *children* it appears to me that there is always an altered state of the nerve-centres, or that the glottic nerves are abnormally susceptible to reflex impressions. Various alleged causes (dentition, indigestion, &c.) appear only to operate when one

of these two conditions exists at the same time. The other symptoms (carpo-pedal contractions, &c.) point to cerebral disease or irritation. Further, it is only necessary to state here again, that true laryngismus is essentially a spasmodic affection. In support of this statement, I would remark—1st. That the other symptoms are those of spasm (contractions of feet and hands, &c.). 2nd. That paralysis of the abductors of the vocal cords permitting the unbalanced action of the adductors, does not produce the intense stridor met with in the affection now under consideration. 3rd. That the total remission of the symptoms points to spasm as the essential nature of the disease. 4th. That where the age and condition of the patient admit of laryngoscopic examination, the spasmodic condition can be seen. In *adults*, there is generally no evidence of cerebral irritation; but the spasm may occur as an hysterical phenomenon, or be due to catarrhal or other congestion of the larynx. In the latter case it is not necessarily the vocal cords which are affected; the spasm may be caused by circumscribed inflammation of parts in the neighbourhood of the cords—especially the ventricular bands.

Prognosis.—In the case of *children*, the prognosis depends on the character of the paroxysm and its supposed cause. Where there is evidence of cerebral irritation, there is always ground for anxiety. Thymic asthma is especially dangerous, and if there is evidence (such as considerable enlargement of the gland) to show that the spasm is of that character, the most unfavourable opinion must be given. The intensity of the paroxysms must always be taken into consideration; but the length of the intervals between each paroxysm is a better prognostic guide—the longer the interval, the greater the chance of recovery. In the case of *adults*, the spasm is generally less severe, the patient's capability of resisting the spasm is of course much greater, treatment (such as inhalation) can be adopted which is not applicable to children, and should tracheotomy become necessary, it is far more likely to prove successful.

Treatment.—The treatment must be twofold: First, to relieve quickly the spasm of the glottis. Secondly, to attack

the source of the disease. In the case of *children*, the immediate treatment generally falls to the nurse or mother. The little patient should be raised and placed in a sitting posture, and then he may be slapped on the back, cold water may be dashed in the face, and ammonia or strong acetic acid held to the nose. Putting the lower part of the child's body in a hot bath, and dashing cold water in its face, is a simple and sometimes successful plan. These measures, by giving rise to violent inspiratory actions, are often successful; but remedies calculated to relieve spasm are equally satisfactory. The warm bath may be used, and as, when the paroxysm is fully established, the patient cannot drink, emetics may be administered, directly there is a sign of stridor. Chloroform often gives immediate relief; but of course must be given with great care to these young subjects. A favourite remedy in Germany, and one that is highly successful, is tickling the fauces with the finger or a feather, until vomiting is produced. Depressing enemata, such as tobacco, have likewise been recommended; but, in my opinion, they cannot be used with safety on children. Tracheotomy always remains as a last resource. In the case of *adults*, inhalations of chloroform, conium, or simple hot water, often give rapid relief. The chloroform need not be given so as to produce insensibility. I generally recommend that forty minims should be dropped into half a pint of hot water, and that the steam should be inhaled. The same quantity of chloroform should be added every five minutes, until some relief is obtained. The preparations of conium sometimes do good, and the seeds have seemed to me to be very efficacious. Whatever part of the plant, however, is used, it must always be prescribed with an alkali to set free the conia. The datura tatula* cigars have been smoked with advantage by two patients who were labouring under this affection. Where other measures fail, and the symptoms are urgent, tracheotomy must be performed.

* Prepared by Messrs. Savory & Moore.

CASE XXVII.—*Spasm of the Adductors (Laryngismus stridulus) in a child, terminating fatally.*

A. E. P., a sickly child, aged 3½ years, was brought to me at the London Hospital in March, 1868, by Mr. Richardson, of the Commercial Road. He was small, emaciated, not distinctly rachitic, but had suffered from strumous enlargement of the cervical glands. The other children of the family were all healthy, but Mr. Richardson informed me that the father had been severely affected with constitutional syphilis. The paroxysms of dyspnœa occurred frequently, and were of long continuance. The very unfavourable prognosis, which we agreed in giving, was borne out by the death of the child, in a severe attack, at the beginning of May—five months after the symptoms had first appeared.

At the *post-mortem* an abscess about three inches in length was found at the right side of the trachea, communicating with the body, or intervertebral substance of the third dorsal vertebra. In the sac of the abscess there were several flakes of cretaceous matter, varying in size from one inch by half an inch, to three-quarters of an inch by one-third of an inch. Near the commencement of the right bronchus, the right recurrent nerve was pressed upon, flattened, and thinned, by the pressure of a diseased bronchial gland about the size of a nutmeg, containing sebaceous-like matter. The nerve was closely united to the diseased gland. The laryngeal muscles were carefully examined, but the results were negative.

CASE XXVIII.—*Spasm of the adductors of the vocal cords in an adult, necessitating tracheotomy.*

Elizabeth P., aged 24, was brought to me in the autumn of 1863, by Dr. Gibson, of Clerkenwell, on account of stridulous breathing, and an exceedingly frequent hacking cough. The cough, however, was not properly formed, but consisted in a rapid succession of sounding expirations. Often the so-called cough was heard forty-five or fifty times in a minute, for several hours together, and this too when the patient was sitting in a room by herself, and unaware that she was

watched. The attacks of severe stridor came on very frequently—at least seven times in the day. She was in very needy circumstances, and worked with a number of other girls at a milliner's. Latterly her fellow-workers had refused to have her in the same room, on account of the trouble and noise caused by her affection. When I saw her first, the symptoms had been coming on for eighteen months, and she had lately been in one of the London hospitals, where her throat had been burnt with caustic. She had not, however, obtained any relief, and was now worse than ever. On making a laryngoscopic examination, it was seen that the vocal cords were spasmodically approximated, and that there was no structural disease of the larynx. The cords were of the ordinary pale colour; they exhibited a continual to-and-fro movement, from the side of the larynx to the median line, where they were spasmodically approximated against one another. When not coughing, the respirations were exceedingly rapid, often sixty in a minute. The patient was weak, but not anæmic, or otherwise out of health.

In this case every treatment was tried without any benefit, or with only the most temporary advantage. Every kind of local application, including caustics, astringents, solution of Calabar bean, &c., &c., were tried. Inhalations also failed, chloroform alone giving temporary relief. Medicines, including powerful narcotics, failed to affect the spasm; belladonna, recommended by Lasègue,* and valerianate of zinc, by Dr. Harley,† in somewhat analogous cases, both failed; and hygienic treatment, including shower-baths, change of air, &c., was also useless.

The patient having become much worse, and the stridor being very intense, tracheotomy was performed, at my request, in July, 1864, by Mr. Francis Mason. I thought that by wearing the tube for some time the tendency to spasm would be overcome. This, however, did not prove to be the case. I have repeatedly endeavoured to dispense with the canula. In 1865 Dr. Parker kindly admitted her into the

* *Archiv. Général.* Mai, 1854.

† *Medical Times and Gazette,* Aug. 1, 1863, vol. ii. p. 116.

London Hospital, and several times the tube was taken out, but invariably after a few hours it had to be replaced on account of threatening dyspnœa.

When examined with the laryngyscope, the spasm of the adductors is seen to be as marked now as ever, but the opening in the trachea renders the patient safe. The respiration is still very rapid, but the cough has almost disappeared.

Case XXIX.—*Spasm of the adductors of the vocal cords; tracheotomy.*

Elizabeth E., aged 48, a cook, living at Saffron Walden, was brought to me in January, 1867, by Dr. Green. The patient stated that she had suffered from difficulty of breathing since July, 1866, when she had a bad cold and croupy cough. Through Dr. Davies' courtesy she was admitted into the London Hospital, under my care. She remained in the Hospital about two months, and during that time suffered from several very severe paroxysms of dyspnœa—so much so, indeed, that tracheotomy was more than once contemplated. The severe attacks were generally accompanied by an abundant thin frothy expectoration; in fact, the symptoms were those sometimes met with in catarrhal asthma, but the obstruction was situated at the glottis. Sedative inhalations and expectorant medicine (Mist. Casc. Co.) seemed to give some relief, and she left the Hospital on the 8th of March a good deal benefited. On the 10th, however, she was brought in a hurry to the Hospital for Diseases of the Throat, and, being in a state of dangerous dyspnœa, tracheotomy was at once performed by Mr. Evans. The patient recovered from the operation, but has since been obliged to continue to wear the canula. It is perhaps worthy of remark in this case that the ordinary canulæ were quite useless; they either did not reach the trachea, or they were quickly expelled from it. The only tube which the patient can wear is one three and a half inches long; and in order to facilitate the cleansing of the tube, Mr. Evans has devised a very ingenious arrangement. The external tube is obliged to be so long that the curve will not permit

the passage of an ordinary inner tube. Mr. Evans* has, therefore, caused the inner tube to be made in links, like the scales of a serpent, so that it can easily bend, and it is made to move by a little rack. In this way the patient can remove and insert the inner tube without difficulty or force, by turning a little button on one side of the shield of the canula. This ingenious instrument will, I have no doubt, prove useful in many cases where a long tube is required to be used. Though not appertaining to the subject now under consideration, I venture to mention this ingenious modification of the ordinary canula, of which no notice has as yet appeared.

Spasm of the Tensors of the Vocal Cords.

Definition.—Spasmodic action of the tensors, causing the vocal cords to be unduly and irregularly stretched, and consequently giving rise to a voice which is feeble, jerky, unsteady, and constantly rising to a high key.

Causes.—In the few cases (8) of this affection which have come under my notice I have not always been able to ascertain its cause. In three cases, however, the patients were constantly obliged to speak to deaf relatives. In the case of a lady from Watford, who was under my care in 1864, there were a deaf husband and daughter; a tax-collector from Enfield, who consulted me at about the same time, had a wife who was "very hard of hearing;" and the husband of Mrs. B. (Case XXXI.) was also deaf.

In two other cases the cause could not be ascertained—the patients had not been subject to excessive or violent use of the voice. Of the eight cases six were men and two women.

Symptoms.—The sound of the voice is so peculiar in these cases that from it alone they can generally easily be diagnosed. The patient is often able to produce some notes, either in his own natural voice or in a slightly muffled tone; but whilst speaking in this way the current of the voice seems to be partially interrupted, and the sound conveys the idea of an arrested action of the respiratory muscles. In fact, it is very much

* Manufactured by Mayer, 59, Great Portland Street.

like the straining and rather suppressed voice of a person engaged in some act requiring the prolonged and steady action of the expiratory muscles (parturition, defæcation). After speaking a word or two, or several sentences, in this peculiar tone, the patient may again utter a few words in a comparatively healthy voice, and then may immediately relapse into the diagnostic intonation. No approach to the spasm is perceived as long as the patient whispers, but directly the voice is sounded it becomes apparent. In three cases the spasm was diminished by exertion (such as going upstairs or walking quickly). This appeared to me to be due to exhaustion of the expiratory muscles, but perhaps it may be that the quickened circulation caused by the exertion had some beneficial influence on the spasm. In one case that I have lately seen, exertion increased the spasm. The tense condition of the vocal cords can generally be easily perceived with the laryngoscope. Their surface, as well as that of the rest of the mucous membrane of the larynx, is usually congested.

Diagnosis.—The laryngoscopic differences between this affection and paralysis of the laxors has been already pointed out in treating of the latter affection. The *varying* voice of the spasmodic case is so different to the *constantly* high-pitched, or totally suppressed voice of the paralytic cases, that the laryngoscope is scarcely required for diagnosis.

Pathology.—The condition appears to me to be due to some morbid condition of the sympathetic ganglia. The cerebro-spinal system does not appear to be at fault. From the cases I have seen it appears evident to me that the affection is not one of simple spasm of the crico-thyroid muscle, but one of spasm of "the expiratory act,"* in which the thoracic and abdominal muscles participate.

Prognosis.—Unless the disease is recognized and treated at an early period it is likely to prove incurable. I had one patient (the Rev. E. G., Case XXX.) under my observation for more than two years; and though he did not improve, he did not appear to get any worse.

* I employ this term in the sense used by Dr. Hughlings Jackson (*London Hospital Reports*, vol. i. p. 364).

Treatment.—I was formerly very unsuccessful in the treatment of these cases, two patients having been several months —one longer—under my care without receiving any benefit. But since I have recognized the true nature of the disease, I have been more fortunate. There are two cases under my care at present, one a clergyman in Somersetshire, recommended to me by my neighbour Mr. Stewart, and another, a clergyman, sent to me by Mr. Corbould, of Bristol, both of whom are almost cured. I say "almost;" for though the spasm has entirely yielded, they are still under treatment, and I shall not report them till the ultimate result is known. Whilst correcting the proofs of this article, I have been consulted by a Dissenting minister from Manchester, labouring under the same affection. I expect to be able to cure him also.

The treatment is very simple. It consists in forbidding the patient to speak, under any circumstances, above a whisper. He should be discouraged from whispering more than is absolutely necessary, and the rule of not sounding the voice must never be transgressed, even for a second.

I also cause belladonna to be applied to the outer part of the throat every night. A drachm of the extract should be spread on a piece of lint about four inches long, and one and a half broad, and worn round the neck, so as to cover both the crico-thyroid muscles. I have used various inhalations, and have certainly seen good result from allowing the patient to inhale the fumes of nitrated paper. It is difficult to understand the *rationale* of the action of inhalations in this affection, unless the intrinsic muscles are also concerned, but it is possible that where the crico-thyroid is alone morbidly active, the beneficial effect of the inhalation may be due to reflex influence, the primary impression being on the mucous membrane.

The following brief records illustrate this affection :—

CASE XXX.—*Dysphonia of one year's duration from spasm of the tensors of the vocal cords.*

Rev. E. G., aged 45, was recommended to me in May, 1864, by Dr. Semple. He stated that he began to become hoarse

about a year previously, and that now he was quite unable to officiate at church. He had the characteristic straining voice of this affection, and spasm of the tensors of the vocal cords, with congestion of the whole of the lining membrane of the larynx, was seen on laryngoscopic examination. Topical applications relieved the congestion, but did not improve the voice. Tonics, sedatives, and linseed poultices over the crico-thyroid also failed to do any good. In 1866 the patient's voice was not in the least improved.

CASE XXXI.—*Dysphonia of four years' standing from spasm of the tensors of the vocal cords.*

Mrs. B., aged 50, from Peckham, consulted me in July, 1864, on account of difficulty of speaking of four years' standing. She said that "she could not get her voice out," and that the affection originally came on with a bad cold. Her husband is very deaf, and she has had to speak very loudly to make him hear. Her general health is not good; she is weak, nervous, and occasionally faints. There does not appear to be any disease of the heart or lungs, and she is not hysterical. With the laryngoscope the tension of the vocal cords was seen to be so great that they appeared to be abnormally long and narrow, the part posterior to the *processus vocalis* appearing unusually developed.

This patient only visited me twice, and I had no opportunity of trying any course of treatment.

CASE XXXII.—*Dysphonia of four months' standing from spasm of the tensors of the vocal cords.*

Rev. H. H., aged 34, of Richmond, consulted me in June, 1866, on account of a peculiar weakness of his voice. He exhibited the characteristic straining in a marked degree, but with longer intervals of healthy voice than I have met with in other cases. It came on suddenly after exposure to cold. His general health was excellent. The vocal cords were seen, with the laryngoscope, to be tense and slightly congested. Absolute silence was unfortunately not enforced in this case, but the patient has derived benefit from having had com-

parative rest of the vocal organ. By my advice he spent last winter at Tangiers, and has returned home considerably improved.

Diseases of the Sensory System of the Larynx.

Hyperæsthesia.—Increased sensibility, occurring independently of inflammatory disease or structural alteration of the tissues of the larynx, is undoubtedly a rare morbid condition; but it may occur either in an intermittent form, or without any periodic character. A case of the former kind is reported by Dr. Gerhardt,* and a few of the latter have fallen under my notice.

Several cases have also been reported by Dr. Handfield Jones.† Neuralgic cases should be treated on the ordinary principles which regulate the therapeutic management of such cases. The inhalation of hot sedative vapours and anæsthetics does good in cases of a non-intermittent character; and the internal use of narcotics is also indicated. Some of the morbid phenomena apparently belonging to motor affections (such as pertussis and nervous laryngeal cough) may be due to increased sensibility of the mucous membrane of the vocal cords, the hyperæsthesia manifesting itself in reflex action.

Anæsthesia.—Though there is great difference between the sensibility of the glottis in different people, anæsthesia rarely occurs as a distinct morbid affection.

Disease affecting the origin or trunks of the pneumogastric nerves, or their superior laryngeal branches, would be likely to diminish the sensibility of the larynx in proportion as the function of the nerves was interfered with.

Romberg has observed that, in cholera, there is impaired sensibility of the mucous membrane of the larynx.‡

* Virchow's *Archiv.* xxvii. Heft 1 and 2.

† *Medical Times and Gazette*, May 2, 1863.

‡ Hufeland's *Journal der pract. Heilkunde*, Feb. 1832.

APPENDIX

ON

ATROPHY OF THE VOCAL CORDS.

THE exceedingly dense structure of the vocal cords, the slowness with which the nutritive changes take place in the normal condition, and the rarity of complete paralysis of the vocal cords, are probably the causes of the infrequency of atrophy of the vocal cords. Even when the loss of voluntary power is complete, the vocal cords often move in respiration and various reflex respiratory acts.

Only four cases of the kind have come under my notice.

Three of the patients had suffered some years previously from syphilis, two from simple chancres without any secondary symptoms, the other from constitutional disease of a highly destructive character. In the fourth case, recorded in my Jacksonian Prize Essay,* the patient was suffering from chronic lead-poisoning. In none of the cases was there any cicatrix in the larynx or pharynx, or anything indicating that there had been ulcerative destruction of the cords. It is also remarkable that in three of the cases, the aphonia came on quite suddenly—a feature pointing to paralysis as the starting-point of the affection. The following are the brief reports of the cases:—

CASE XXXIII.—*Aphonïa of twelve years' standing from atrophy of both vocal cords.*

Abraham H., aged 49, came under my care in February, 1864, on account of loss of voice of twelve years' standing.

* Library: Royal College of Surgeons.

He was formerly a good amateur singer, and had a fine, strong, clear voice. One night, after singing, he lost his voice, and since then he has never been able to speak, except in a whisper. He has never experienced any pain or soreness in the throat. Fourteen years before losing his voice he had a chancre, but has never had any constitutional symptoms. For many years after losing his voice he could only speak in a low whisper, but his whisper is now loud and strong.

On laryngoscopic examination, the parts superior to the vocal cords were seen to be perfectly normal, but only a small portion of the left vocal cord was visible; on attempted phonation, the cords appeared as two narrow threads, scarcely perceptible except at the vocal process, and leaving a large open central space. In March, 1864, I had the opportunity of showing this remarkable case to Dr. Sieveking. The appearance is seen in the annexed woodcuts.

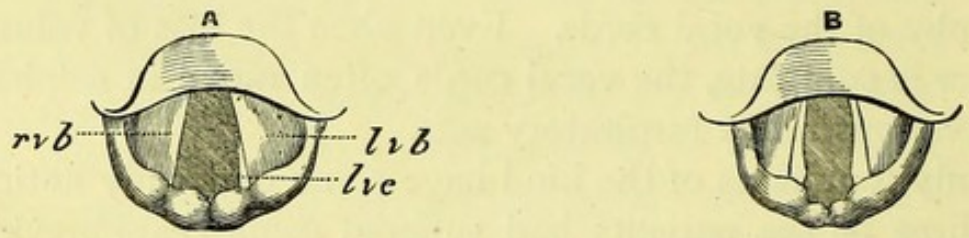


FIG. 8. Atrophy of the vocal cords.

A Inspiration. *B* Attempted phonation.

rvb. Right ventricular band (false cord).

lvb. Left ventricular band,

lvc. Left vocal cord—or vestige of cord seen on inspiration.

CASE XXXIV.—*Aphonia of sixteen years' standing from atrophy of the right vocal cord.*

Catherine H., aged 45, is at present under my care as an out-patient at the London Hospital. She states that she was married eighteen years ago, and that shortly after her marriage she suffered from syphilis. Sixteen years ago she had a slight sore throat *at the upper part*, for which she put on a mustard poultice, and on waking the following morning her voice was gone, and has never since returned. On making a laryngoscopic examination, it is seen that on attempted phonation there is a space about three-eighths of an inch

wide, between the edge of the left vocal cord (which approaches well to the median line) and the right side of the larynx. There is only a trace of a vocal cord on the right side—a small portion of membranous-like structure in the anterior half of the larynx being all that is left. The patient is only able to speak in a low whisper, and cannot cough at all. She sneezes, however, naturally. She presents scars on different parts of the body, and has lost part of the alæ of the nose from destructive ulceration; but there are no cicatrices in or about the larynx. Twelve years ago the patient had hemiplegia of the right side, from which, after several years, she gradually, but not completely, recovered. She has now threatening symptoms of paralysis on the left side. The appearance on attempted phonation is here shown.

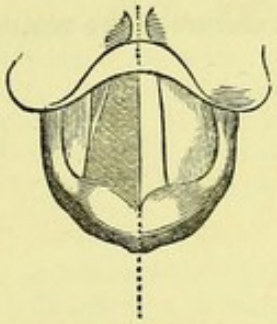


FIG. 9. Atrophy of the right vocal cord: attempted phonation; a small portion of membrane in the anterior part alone represents the right vocal cord.

CASE XXXV.—*Dysphonia of eight years' standing from atrophy of the right vocal cord.*

W. B., aged 36, is at present an out-patient, under my care, at the London Hospital. He was first seen by me in April, 1866. He states that he was formerly a drill-sergeant in the Royal Navy, and that one day whilst giving the word of command, his voice suddenly went altogether, so that he could not speak above a whisper. A few days afterwards it returned to a slight extent, but was very gruff. He is now in very good health, but his voice is very thick, scarcely sounding at all. With the laryngoscope not a trace of the right vocal cord can be seen on inspiration, whilst the left cord is perfectly evident. The non-appearance of the right cord is not due to the presence of any swelling on the right side,

occluding the view. On attempted phonation, the closure of the ventricular bands (false vocal cords) prevents a view of the parts beneath; but as the appearance of the ary-epiglottic folds and their cartilages is normal and symmetrical, it is evident that there is no muscular paralysis, and that the aphonia is due to the atrophy or destruction of the right cord.

FIG. 10. Atrophy of the right vocal cord.

A Inspiration: absence of right cord, with unsymmetrical position of the cartilages of Wrisberg.

B Attempted phonation. The closure of the ventricular bands prevents a view of the vocal cords.

WYMAN AND SONS, PRINTERS, GREAT QUEEN STREET, LONDON, W.C.

OPINIONS OF THE PRESS.

(First Edition.)

"Dr. Mackenzie, who has devoted much attention to Laryngoscopy, adduces fourteen cases, in which, by means of an instrument of his own invention, the voice was restored after one or more applications of the galvanic current to the vocal cords, and that, too, in cases where the voice had been absent for a year, eighteen months, and even three years. As such cases of functional aphonia are of frequent occurrence, and often resist the usual modes of treatment, we would direct the attention of our readers to Dr. Mackenzie's very interesting paper."—*Edinburgh Medical Journal.*

"To Dr. Mackenzie we are indebted for the invention of an ingenious instrument, by means of which the electric current passes directly to the parts affected. It is only necessary to read Dr. Mackenzie's pamphlet to be convinced of the great advantage which this mode of operating possesses over that hitherto in vogue, and the illustrative cases are amply sufficient to prove what satisfactory results may be thus achieved."—*Glasgow Medical Journal.*

"Dr. Mackenzie has contrived a very simple and efficient instrument, with which he has succeeded several times in curing cases of long-standing aphonia, which had obstinately resisted the ordinary mode of applying galvanism. Dr. Mackenzie's cases are given in a plain, straightforward manner, and though most surprising, we have not the slightest doubt of their critical truthfulness."—*Dublin Quarterly Journal.*

BY THE SAME AUTHOR.

The Use of the Laryngoscope in DISEASES OF THE THROAT. With an Appendix on Rhinoscopy. Second Edition, Revised and Enlarged. 8vo. Cloth. 6s.

Opinions of the Press.

"Of all the works in this country, which have described the application of Laryngoscopy and Rhinoscopy, that of Dr. Mackenzie is the clearest and most reliable guide, and the one which gives the greatest amount of useful information. . . . . His treatise remains the best English work on its subject." —*Lancet*, Feb. 29, 1868.

"The first edition of Dr. Morell Mackenzie's work on the Laryngoscope appeared at the beginning of last year, and has already been exhausted. This was but a natural result of its merits. He has now issued a second and revised edition, which, we have no doubt, will more than sustain the reputation of its predecessor as a most complete treatise on the subject."—*British Medical Journal.*

"It is one of the best works for a beginner that we have seen."—*Medical Times and Gazette.*

"It is a thoroughly practical book; and to all who desire to become acquainted with these methods of exploring and treating throat affections, it must prove of great value. Its author is already well known to the profession as an earnest and successful investigator of these forms of disease. . . . . We have much satisfaction in recommending this book to the profession. It is just what such a treatise ought to be—brief, clear, and systematic; whilst every page exhibits the results of the author's matured experience and reflection."—*Edinburgh Medical Journal.*

"Those who are anxious to study the diseases of the larynx and the mode of using the Laryngoscope, cannot do better than purchase the treatise before us, as it is by far the best which has been published in this country, and is thoroughly to be relied upon."—*Glasgow Medical Journal.*

"The book before us is not only a well got-up work, but is in every respect a useful manual to whoever—student or practitioner—may wish to know how to use the Laryngoscope."—*Dublin Quarterly Journal.*

"It is undoubtedly the best book of the kind hitherto published."—*British and Foreign Medico-Chirurgical Review.*

See also *Medical Circular*, *Medical Mirror*, *Ranking's Abstract*, *Philadelphia Medical and Surgical Reporter*, *Union Médicale*, *Gazette des Hôpitaux*, *&c. &c. &c.*

ROBERT HARDWICKE: 192, PICCADILLY.