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LARYNGOSCOPY IN CASES OF TUMOR INVOLVING THE RECURRENT LARYNGEAL NERVE.

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THE phenomena excited by the pressure of tumors upon the intrathoracic organs are familiar to every physician. These are referable to the respiratory system and voice, the function of deglutition, the venous circulation and the arterial pulse. In the present paper I shall refer only to the first two of the phenomena above mentioned, and of these shall dwell particularly upon the effect produced upon the functions of the vocal apparatus. Before, however, proceeding to the consideration of the subject of an addition to the means of diagnosing thoracic tumors, and as an interesting and fitting preliminary to that subject, I shall refer to a case of thoracic aneurism, in which I had the opportunity of seeing, by the aid of the laryngoscope, the changes produced in the larynx by pressure upon the pneumogastric and recurrent laryngeal nerves.

In November, 1864, there came under my care a man who exhibited a tumor bulging through the upper part of the sternum, the record of whose case I afterwards read before the Society, in connection with the minutes of the autopsy made by Dr. Ellis, to whose care, at the Massachusetts General Hospital, I had advised the patient to commit himself. For the details of this case I refer the members of the Society to the *Extracts from the Records of the Society*, published in *The Boston Medical and Surgical Journal*, Vol. lxxii., p. 18. At this time I shall refer only to the chief points in the record of the case itself and of the autopsy.

When I first saw Watson, the patient referred to, namely, on Nov. 3d, there was no doubt of the existence of a tumor which was pressing upon important nerves and vessels. There was also little doubt that this tumor was an aneurism, either of the aorta implicating the arteria innominata, or of this latter vessel itself. The appearances exhibited by the tumor; the pain shooting from the shoulder up the side of the neck; the inequality of the pulse at the wrists; the

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hoarseness and dyspnoea, paroxysmal in their character, all served to make the diagnosis easy. The patient died, of exhaustion, Dec. 5th, and at the autopsy an aneurism was found just at the point of origin of the arteria innominata, and seeming to belong to it rather than to the aorta. The tumor pressed forwards through the sternum, and backwards flattening the arteria innominata itself, and compressing the pneumogastric nerve, the right primary bronchus and the oesophagus. In the minutes of the autopsy no mention is made of the recurrent laryngeal nerve, and it was probably implicated in the tumor in such a manner as to escape observation after the parts were removed from the body.

On two occasions before the patient's entrance into the hospital, I made a laryngoscopic examination, and I copy from my note-book the description of the appearances presented, and offer also a wood-cut, copied from the drawing I made at the time.

Upon examination with the laryngoscope, on Nov. 23d, the right vocal cord was seen to be slack,* making a curved line from the anterior insertion, which in this case was visible, to the arytenoid cartilage. This cartilage lay considerably nearer the median line than its fellow of the opposite side, and the processus vocalis stood out quite prominently into the aperture of the glottis. During respiration, no movement of the right vocal cord took place, while on the left side the cord swung to and fro with inspiration and expiration.† Upon an attempt at phonation, the left cord approached the median line; the right cord also moved, so that the arytenoid cartilages came together pretty well, the cartilages of Santorini also touching one another. The right vocal cord did not, however, become tense, and its vibrations, as might be expected, were very coarse. There seemed to be, moreover, a somewhat general injected condition of the mucous membrane lining the interior of the larynx, although this was not very marked.

In the cut subjoined, *E* is the epiglottis; *s*, the cartilage of Santorini surmounting the arytenoid cartilage; *w*, the tubercle of Wrisberg; *p v*, the processus vocalis; *R C*, the right vocal cord; *L C*, the left vocal cord. Through the glottic aperture are seen rings of the trachea.

It will readily be seen that with such a condition of the parts an altered state of the voice was inevitable. A slight degree of hoarseness might have been occasioned by the abnormal condition of the mucous membrane, but the excessive hoarseness which existed in

* It will be remembered that in the laryngoscopic mirror the parts are reversed, that which appears to be the right side being really the left.

† I have noticed that this movement, studied particularly by Prof. Dalton in his experiments on the lower animals, is not uniformly present except where, from some cause or other, the respiratory movements are hurried.

this case was evidently due, as could be seen in the mirror, to the slackened condition of the right vocal cord.

I shall here offer a few remarks and cite some cases, to show in what manner the laryngoscope may aid in the diagnosis of thoracic tumors. Cases of such tumors are not rare, in which the closest examination of the chest has for a long time, and even up to the time of death, failed to detect the actual cause of the symptoms presented, and although in many cases, perhaps in most, the fact that a tumor of some kind exists is easily made out, in others there is the greatest doubt whether the laryngeal symptoms are due to inflammatory action in the larynx itself, or to irritation of the recurrent nerve. The best, and, before the invention of the laryngoscope, almost the sole aid in cases where only laryngeal symptoms were present, was the rule indicated particularly by Dr. Stokes, viz., in the alteration dependent on laryngeal disease, the hoarseness or aphonia is constant; while in the functional affection of the voice from pressure on the recurrent nerve, remarkable variations in the tone and power of the voice frequently occur within short spaces of time. I may mention also the stress laid by Stokes on the loud, ringing cough. Instances, however, are on record in which tracheotomy has been performed for acute laryngitis, when the symptoms depended upon aneurism of the thoracic aorta. Dr. Watson mentions such an example.*

Of cases bearing on this subject, Liston's is perhaps known to most of the members of the Society. Dr. O'Ferral, in vol. vii. of the *Medical and Chirurgical Review* of Edinburgh, in connection with the relation of an obscure case of aneurism, says that after an unusually careful examination of Mr. Liston's chest, not the slightest symptom could be found looking to the presence of aneurism.

I proceed to mention other cases pertinent to this subject.

In the *London Medical Times and Gazette*, Vol. xlix., I find one or two articles which I shall copy at some length, as affording excellent arguments in favor of the employment of the laryngoscope in doubtful cases of the kind under consideration.

The first article is on page 33, and is a report of hospital practice, the case brought up being under the care of Dr. Geo. Johnson, one of the best English laryngoscopists.

"Aneurism of the Arch of the Aorta, compressing the Vagus and Recurrent Nerves, and causing Symptoms of Laryngitis. Diagnosis by aid of the Laryngoscope."

This case is a good illustration of the occurrence of laryngeal symptoms in thoracic aneurism from pressure on the recurrent laryngeal. It shows, too, the great practical value of the laryngoscope in affording the negative evidence that there was no actual disease

* It should be mentioned in this connection that a tumor may so obstruct the veins leading from the larynx as to cause a dropsical condition of the laryngeal mucous membrane, and this to such a degree as to demand the performance of tracheotomy.

in the larynx. In all cases of laryngeal dyspnoea, especially when the dyspnoea is paroxysmal, the chest should be carefully examined; and, indeed, when there are merely symptoms of laryngitis, or even altered pitch of voice, it should not be omitted. "It cannot," says Dr. Gairdner, "be too strongly insisted on, that a physical examination of the chest should take place in all cases of supposed laryngeal disease." But sometimes an examination of the chest does not give us definite information, as in Dr. Johnson's case. To quote again from Dr. Gairdner's paper:—"The absence of the physical signs of aneurism or tumor should not suffice to remove completely the suspicion that they may be concerned in the affection of the larynx." In such cases the laryngoscope supplies a real want.

J. H., aged 31, a hawker, of intemperate habits, was admitted, under the care of Dr. George Johnson, into King's College Hospital, July 16, 1863. About seven weeks before his admission, after being out drinking all night for five nights in succession, he first experienced a sensation of "stoppage in the throat," and lost his voice. The throat symptoms continued more or less until the time of his admission. For eight days prior to admission he had experienced a difficulty in swallowing solids. For five days the voice had become more husky; he had cough and difficulty of breathing, and the breathing was attended with a loud noise in the throat.

The symptoms on admission were cough, with dyspnoea and noisy laryngeal breathing, hoarseness, and difficulty in swallowing solids. He states that sometimes the noise in his throat entirely ceases, and he partly regains his voice, but the noise is usually louder while he is asleep.

On laryngoscopic examination by sunlight, the mucous membrane of the larynx was seen to be slightly congested, but there was no swelling; the arytenoid cartilages were freely movable, and the glottis opened wide during inspiration. At the time of the examination, the breathing was not stridulous.

It was evident (Dr. Johnson remarked) from this examination, that the laryngeal symptoms were not the result of laryngitis or other structural disease in the larynx. Aneurism of the aorta, or other source of pressure on the recurrent nerve was suspected and carefully sought for, but there was no physical sign of aneurism, no dulness on percussion, and no pulsation or morbid sound; the pulse was equal in the two wrists.

On the 18th, two days after his admission, he spat up a few mouthfuls of florid blood and felt rather faint at the time.

On the 20th, at 1.15, P.M., he suddenly became faint, and brought up, apparently by vomiting, about three quarters of a pint of florid blood. When Dr. Johnson saw him, at 1.45, he was still pale and faint, as if from internal hæmorrhage. No more blood had been brought up, but on percussion over the stomach there was marked dulness, and it seemed probable that the stomach was becoming fill-

ed with blood. He was directed to swallow constantly small pieces of ice. He continued to sink gradually, and died at 5, P.M.

On examination, twenty-three hours after death, an aneurism about the size of a small orange was found at the back of the transverse portion of the arch of the aorta. The aneurism had opened backwards into the œsophagus by an oval aperture three quarters of an inch long and half an inch wide, the opening being partly covered by coagula. The stomach was filled with blood. The left pneumogastric nerve passed in front of the aneurism and was somewhat flattened in doing so. The recurrent nerve passed behind the tumor in its course upwards to the larynx. Both the pneumogastric and its recurrent branch had evidently been stretched and compressed by the aneurism."

In the same number of this journal, p. 34, is the report of another interesting case, which occurred at the London Hospital, and which I here copy in part.

"Thomas D., aged 30, well nourished, and of considerable muscular development, but having large arcus seniles, applied at the hospital Dec. 1, on account of a burning pain in the chest. On inquiry, it was found that lately he had several times 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 cardiac or lung disease, nor could any aneurismal tumor or abnormal bruit be detected, and there were no signs of venous obstruction (from pressure on the large trunks).

This 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 became suddenly 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 laborer) 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 labor.

A laryngoscopic examination was made by Dr. Morell Mackenzie, who gave the following report:—

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 the other cases of unilateral spasm of a vocal cord that have come under my notice; but it must be remarked that, in

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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 differences between the two sides being less marked than is usual. On gentle phonation, the left vocal cord is observed 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 true 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 at all eclipsed by the false cord on the same side. The patient can only speak in a high-pitched, squeaking voice, of a somewhat falsetto character.

It may not be out of place to observe that the long-recognized relation between aneurism of the arch of the aorta and an altered tone of voice was first proved with the laryngoscope to depend on paralysis of the left vocal cord, by Professor Traube, of Berlin. Cases also have since been observed by Drs. Semeleder, Smyly and others. In Traube's case, besides an immobile condition of the left vocal cord, there was hyperæmia of the false cords and epiglottis, and of the mucous membrane over the arytenoid cartilages.

Subsequent to this report the patient has become worse, and now the left pulse is decidedly fuller than the right, and there is a very slight systolic murmur, but only to be heard at the apex of the heart. The chest has been examined very many times, but no physical signs of aneurism have been found. There has never been the least difference in the pupils. Taking into consideration all the circumstances of the case, the spasm of the left vocal cord may not unreasonably be thought to depend on pressure of the left recurrent nerve by a thoracic tumor: that the thoracic tumor is an aneurism of the arch of the aorta is very probable. This patient's voice has gradually altered from hoarse to squeaky."

Following these two reports of cases comes, in the number of the *Medical Times and Gazette* of Jan. 16, a letter from Dr. Gairdner, which I also copy:—

"*To the Editor of the Medical Times and Gazette.*

SIR,—I have just perused in your journal of this day, the interesting records of two cases of aneurismal disease, detected mainly by laryngoscopic examination. I am able to add to them a brief statement, not, indeed, of a case of aneurism, but one of tumor, in which this modern addition to our means of diagnosis was of great service. Some months ago I was consulted in the case of a lady, who, for ten years or more, had had a moderate sized goitre-like swelling closely applied to the lower part of the trachea, and extending into the anterior mediastinum.

As the neck was very short and thick, owing to the obesity of the patient, the diagnosis was rather difficult; and as a suspicion had formerly existed of disease of the heart, on account of which she had at one time consulted Sir James Clark, there was a further uncertainty as to the cause of her symptoms. These were—1. A degree of difficulty of breathing and cough, almost equally divided as to characters between thoracic and laryngeal. 2. An alteration in the tone of the voice, and a slightly stridulous inspiration. 3. Expectoration of frothy mucus, just tinged, on one or two occasions, with blood. These symptoms were for the most part recent, the goitre having for many years caused her no inconvenience.

I have fully discussed the importance of these symptoms as indicating aneurism, in my "Clinical Medicine," referred to by your reporter. In this instance, no clear evidence of thoracic disease could be detected, except a slight prolongation of the first sound of the heart, which might very well be regarded as functional. I therefore viewed the symptoms as probably dependent upon the implication of the recurrent, on one or both sides, in the goitre, or in the surrounding thickening of the cellular tissue. The nature of the goitrous swelling being obscure, and the influence of remedies upon it uncertain, the prognosis was grave and anxious: I need say nothing about the treatment. The sudden death of the patient, some time afterwards, fully justified the prognosis, and a *post-mortem* examination, rather hastily conducted, but still practically complete and satisfactory, showed that an apparently carcinomatous degeneration of the thyroid gland was the true cause of the symptom.

The case occurred during Dr. Czermak's visit to Glasgow, and he had an opportunity of examining the larynx during the life of the patient. The parts brought into view by the laryngoscope were all perfectly sound as regards structure and anatomical relations. But the left vocal cord was absolutely motionless in inspiration, and in the formation of the voice. This observation was regarded both by Dr. Czermak and the physicians primarily engaged, as affording complete confirmation to the diagnosis of a tumor implicating the recurrent nerve.

I have for many years habitually employed a rather long forefinger in the exploration of the larynx down to the glottis, and by the method of touch have usually found it easy to acquire valuable information in regard to the state of the vocal cords and arytenoid cartilages in doubtful cases of this kind. I have rarely, if ever, found an exception to the rule, that well-marked laryngeal stridor or cough with imperfectly closed glottis, indicates a tumor pressing on the recurrent, if the epiglottis and glottis are normal. It is partly by giving us greater assurance on this point, and partly by developing the positive proof of inequality of movement on the two sides of the glottis, that laryngoscopy may be expected to assist our diagnosis of a difficult and doubtful class of cases."

I have only a few words to add to what has already been said. In regard to the appearances which are presented in the interior of the larynx when the recurrent nerve is undergoing pressure, these may vary considerably. It has been already intimated that the laryngoscope may detect no abnormal appearances whatever. In such cases the laryngeal symptoms are produced, it may reasonably be inferred, by the irritation of a nerve which is suffering only slight pressure. On the other hand, not only is partial loss of power of the laryngeal muscles often found to exist, but sometimes a complete paralysis is noticed. It is certainly a gratifying circumstance that we are no longer obliged to content ourselves with classing indiscriminately all the abnormal laryngeal phenomena under the indefinite head of functional disturbance, but that we may see pathological changes in the larynx when they exist, and note the manner in which these phenomena are produced. In the patient Watson's case, without the aid of the laryngoscope, we must have explained the hoarseness in very general terms, as consequent upon irritation of the recurrent nerve; with the aid of this instrument, we find a simple mechanical cause for this departure from the normal state in the slackened condition of one of the cords; such a want of tension causing coarse vibrations during phonation, and necessarily a rough, hoarse voice. Had such a state of things been found existing, even if all other symptoms of aneurism had been wanting, and a physical examination of the chest had failed to detect the tumor, we should, I think I may safely say, have been fully justified in concluding that a tumor of some kind or other was being developed, and should have been able to locate it in the course of the recurrent nerve.

I must not forget, before I close, to mention the fact that in very rare instances the recurrent nerve has been found pressed upon by a tumor, when during life no laryngeal symptoms were exhibited. Such an instance is mentioned by the reporter of Dr. Johnson's case, already referred to. At the autopsy, the nerve was found to be "flattened out," and yet the patient's voice had been clear to the last. "It may be," says the reporter, "that the pressure had affected the nerve very gradually, as we know that there is a remarkable difference in the effect of gradual and of sudden pressure on nervous tissue."

THE CHOLERA AS IT APPEARED AT THE PORT OF NEW YORK IN 1865.

BY J. SWINBURNE, M.D., PORT PHYSICIAN.

THE "Atlanta," an English mail steamer, iron-built, of 325 feet in length, and 36 feet beam, with two first and second cabins fore and aft on the deck, and three separate steerages of 98, 80 and 70 feet