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### A STUDY OF THE LARYNX IN TABES.\*

BY D. CROSBY GREENE, JR., M.D., BOSTON.

THE subject of laryngeal disturbances in tabes has been investigated by many observers. The most valuable work is an elaborate monograph on the subject published in 1903 by H. Dorendorf, of Berlin, in which there is a complete résumé of the literature to date, and a detailed report and study of laryngeal manifestations found in the course of the examination of 245 cases of tabes in Gerhardt's clinic in Berlin. I have referred to this work frequently.

My purpose here is to report the result of recent examinations made at the Massachusetts General Hospital, the Massachusetts State Hospital at Tewksbury, and at the Long Island Hospital, in sixty cases of tabes.

These were observed with reference,

- (1) To the proportionate number affected with paralytic and other disturbances of the larynx.
- (2) To the nature of such disturbances, and
- (3) To the period of their occurrence in the course of the disease.

(1) Out of the 60 cases examined, 9, or 15%, presented laryngeal complications; 6, or 10%, showed undoubted paralysis of one or both vocal cords; 7, or 12%, were affected with laryngeal crises, 3 of these without evident paralysis of either cord; and one presented a jerky movement of the cord in moving from the median line. Dorendorf found paralysis in 12%, and crises in 3% of his cases, while 4% showed the jerky movement of the cords which has been called ataxic, a much larger proportion than I found.

(2) In regard to the nature of these disturbances, the only form of paralysis which I saw was abductor paralysis. Of the 6 cases, 5 were unilateral and one was bilateral. These were further divided into 3 with partial and 3 with complete abductor paralysis, that is to say, in the former there was marked limitation in the outward excursion of the cord and in the latter there was absolute fixation of the cord in the median position.

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In partial paralysis the cord at rest is approximately in the cadaveric position. It moves to the median position in phonation, but does not move outward beyond the cadaveric position in respiration. It is not warrantable to make the diagnosis in this stage without repeated examinations at intervals, on account of the variation in the excursion of the vocal cords which may be noted in normal individuals. In this connection I will mention one source of error in making the diagnosis of partial paralysis, pointed out to me by Dr. Coolidge, which lies in an asymmetrical position of the larynx not infrequently met with. The larynx being tilted to one side or the other there may be a difference in the degree of movements of the two cords as seen by the laryngoscope which is apparent rather than real.

In complete abductor paralysis there is no difficulty in diagnosis. The cord remains constantly in the median line. At the same time the arytenoid on the affected side is tilted forward depressing the processus vocalis so that the cord appears shortened and at a slightly lower plane than its fellow. There is also some bowing of the free edge of the cord. The change from the condition of partial to that of complete paralysis has been observed by Dorendorf in a few cases.

It is a remarkable fact that in this disease the paralysis should limit itself in the great majority of cases to the posterior crico-arytenoid muscle, while all the other intrinsic muscles which are supplied by the recurrent nerve, with the exception of the thyro-arytenoid internus are apparently unaffected. Grabower showed conclusively in a number of cases which were autopsied that there was a degeneration in the motor fibers of the vagus which supply the recurrent laryngeal nerve, but he found that it affected not only those fibers which supply the posterior crico-arytenoid, but also those supplying the other intrinsic muscles of the larynx. Recently he has further shown, by actually counting the number of fibers which go to the different groups of laryngeal muscles, that the posticus is supplied with much fewer nerve fibers than the other groups.

The explanation of the apparent restriction of the paralysis to the abductor muscles seems then to be that we are here dealing with a slowly progressive degeneration of the fibers of the recurrent laryngeal nerve. The abductors being the weaker group, especially as regards nerve supply, and hence having a proclivity to paralysis which was first demonstrated by Semon, are the first to succumb.

The vocal cord becomes drawn to the median line at first by the contraction of the adductors, and later by actual shortening of these muscles from atrophy. When the degeneration in the recurrent nerve progresses rapidly complete recurrent paralysis is to be expected, and this condition has been reported in some cases of tabes by Semon, Dorendorf and others, although I did not find one case.

Laryngeal crises occurred as a symptom of tabes in conjunction with abductor paralysis

in four of my cases, and without paralysis in three cases. These crises are characterized by pain or a sense of irritation in the larynx followed by cough, dyspnea and loud inspiratory stridor. In a mild case the attack closely simulates whooping cough. It begins with a succession of short coughs followed by an inspiratory whoop. Then comes another succession of coughs followed by another whoop, each succeeding whoop being a little severer than the last up to a certain point when the attack begins to subside. There is no distress manifest, and the attack lasts only a few minutes. In severe cases, on the other hand, the attacks are most alarming. The breathing becomes noticeably difficult, the inspiratory stridor is loud and prolonged. The face becomes cyanotic, and in the worst cases the patients fall to the ground, lose consciousness, the breathing stops and epileptiform twitchings occur. Death may occur, but in the great majority of cases the attacks end spontaneously. One of my cases with bilateral abductor paralysis, who had for two or three years laryngeal crises of the most violent type at frequent intervals, almost every day, now has them only once in a few weeks. The attacks have greatly diminished in severity and he has now very little dyspnea. This is probably due to the fact that the adductor muscles are now weakened to such an extent that they can no longer produce strong spasm of the glottis.

I have mentioned the appearance in one of my cases of a jerky movement of the cords in moving from the median position. After phonation the outward excursion of the cord was interrupted, the cord remaining stationary for a moment on its way to the position of abduction. This is the so-called ataxia of the cords reported by Krause, Semon and others. The phenomenon is a comparatively rare one, and its etiological relationship to tabes is not established.

Disturbances of sensibility in the larynx, hyperesthesia and anesthesia have also been reported by other observers, but I did not find any case in which the disturbance seemed marked enough to justify one in classing it outside of normal limits.

(3) With reference to the stage of the disease in which laryngeal manifestations appear, I found that laryngeal crises, when present, occurred among the earliest symptoms in all of my cases. In two the crises led to examination of the larynx and subsequent detection of the disease of the nervous system.

Unilateral abductor paralysis does not of itself necessarily interfere with phonation or respiration. It may, therefore, exist for a long time without being discovered. Lockard reported four cases of abductor paralysis in which other symptoms of tabes were preceded by some months. It is obviously impossible to say in what stage of the disease paralysis of the cords occurs in the majority of cases, but we are justified in inferring that it probably occurs early.

I will close with a brief account of the two cases I saw in which examination of the larynx led to the diagnosis of tabes.

CASE I. April 22, 1905. C. E. C., a colored laborer came to the Throat Department of the Massachusetts General Hospital for treatment of his throat. He stated that his present trouble had begun ten days previously when he was seized in the evening by a violent spasm of coughing associated with a painful strangling sensation in his throat. He could hardly breathe. One or two similar attacks had occurred almost every day since that time. He admitted having acquired syphilis ten or twelve years before, but thought he had long been cured of that and was in good health at the time of his first attack of coughing. He now complained not only of these attacks but of loss of strength and general lassitude.

On laryngeal examination the left vocal cord was seen to remain fixed in the median line during both phonation and respiration. The left arytenoid was tilted forward and the cord was shortened in appearance. The free border was concave. The right cord presented the normal degree of excursion and during phonation met its fellow in the median line, the resulting vocal sound being somewhat roughened.

The patient was then referred to the Nerve Department where he was examined by Dr. Baldwin, who made the diagnosis of tabes on absence of the patella and Achilles reflexes and the characteristic Argyll-Robertson pupil.

This case was, then, one of typical unilateral abductor paralysis in tabes, in which the laryngeal examination gave the first intimation of the essential lesion of the nervous system.

CASE II. The second case, H. B. R., was a man forty-five years of age, who first came under my observation in June, 1904, in the Throat Department of the Massachusetts General Hospital. He had been troubled for several months with a spasmodic cough which he attributed to irritation in his throat.

Although he gave no history of venereal disease, his throat presented numerous evidences of an old ulcerative process which had healed leaving several scars in his fauces and a small perforation of the right anterior pillar. The laryngeal examination was rendered most difficult by the anatomical deformity of the upper part of the larynx, especially the epiglottis. The latter was narrow, curved longitudinally and drawn backward by cicatricial contraction of the aryepiglottic folds. The entire ventricle was constricted, but not sufficiently to offer obstruction to respiration, which was usually free. I was unable to see more than the posterior ends of the vocal cords, but this was sufficient to show that there was a limitation in the outward excursion of the right vocal cord. This observation was confirmed by two subsequent examinations at intervals. I at first attributed the limitation in movement to the cicatricial condition noted. At his second visit, however, the manipulation for making the laryngoscopic examination apparently started a slight attack of coughing which, instead of desisting after I had stopped the examination, increased. A succession of short coughs was followed by an inspiratory whoop which was in turn followed by more coughs and a louder whoop, and so on for several minutes, and then the attack gradually subsided. At the height of this attack the patient was cyanotic and was plainly distressed for breath. He informed me that it was for just such attacks which occurred daily and sometimes several times a day, that he had come for treatment.

This patient was also referred for examination to the Nerve Department where the diagnosis of incipient tabes was made.

The practical conclusion to be drawn from this study from a laryngologist's standpoint is that tabes as an etiological factor, either of vocal cord paralysis or spasmodic laryngeal cough, should never be overlooked.

I am indebted to the staff of the Nerve Department of the Massachusetts General Hospital for their courtesy in allowing me free rein in the examination of their cases of tabes.

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## A CONTRIBUTION TO THE ETIOLOGY OF "LATERAL CURVATURE" OF THE SPINE.

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I wish to present three cases of "lateral curvature" of the spine, which I have had a chance to examine by means of the x-ray during the last week, and which show conditions interesting for the anatomist, biologist and especially the orthopedist. The cases are three girls, J., S., and T., sixteen, fifteen and twenty-three years of age; two of them attend school, one does housework.

Their history shows so few characteristic features, that it does not seem worth while to give it here *in extenso*. I only need to mention that there is no hereditary history of spinal curvature, no history of rickets in childhood.

The present affection came on extremely slowly, in the oldest case five or six years ago, in the two other cases two or three years ago without any symptoms to speak of. The deformity was not noticed first by the patients themselves, but by the aunt or the dressmaker.

The examination shows us three girls of apparently good health and constitution, with no deformities in the extremities, no signs of past or present rickets, no asymmetrical shortening of legs.

The spine deformity, represented and clearly seen in the following records, shows in case J. a typical left lumbar with compensation mostly in the cervical part, the rotation on the convex side of the curve. In both other cases S. and T. there is the typical S-curve, more marked in T. than in S.; the rotation is present in lumbar and dorsal region on the convex side, and is still more marked in bending over. There is practically no limitation of the spinal motions. Thus the cases represent what is known to every medical man as juvenile or habitual scoliosis (primarily lumbar).

In each case a careful x-ray was taken. This was done under my supervision with the patient lying flat on the back; as the compression-cylinder was used the spine had to be taken in three sections, one overlapping the other. A print of each one was made afterwards and the prints were put together to a full spine. (Retouching was used only in case J.)

The x-rays show, as to the curvature, conditions

corresponding to the clinical picture. Lateral deviation and distortion in the whole spine are clearly seen.

The most surprising conditions are offered by the lowest lumbar vertebra. The explanation of these conditions is very difficult for many reasons. In the first place the region has practically never been studied by the radiologist; it offers, furthermore, many anatomical difficulties, for instance, prominences in antero-posterior direction, overlapping each other; a lateral view can hardly be taken; finally as to our special cases here, the conditions seem to me entirely new. For all these reasons it seems to me a very bold undertaking to try to explain the conditions entirely and I am sure my description will be an incomplete one. But it is merely the aim of this paper to call the attention of the orthopedic surgeons and radiologists to these conditions for criticism and further study.

As far as I am able to explain the x-ray pictures, the lumbo-sacral region gives evidence of an anatomical and apparently congenital malformation in the sense of an incomplete development of a sixth lumbar vertebra with more or less fusion to the fifth lumbar vertebra and to the sacrum. Further studies must explain the details.

That these conditions exist and are already known to the anatomist is shown by the wonderful collection of congenital abnormalities of the spine in the anatomical department of the Harvard medical school, probably the foremost collection of this kind in the world. Professor Dwight had the great kindness to demonstrate this collection to me and gave me the permission to use his specimens for further study and research. I am very much indebted to him.

The very justifiable question will come up: Granted that my x-ray explanations are right and that the conditions represent congenital malformations of some form in the above-mentioned region, are they only incidental or do they really represent the cause of the spine curvatures in our three cases? In answer to this question has to be said: The top of the sacrum and the fifth lumbar vertebra are the foundation of the human spine and only as long as this base is normal, that is symmetrical, the symmetrical development of our spine is possible. Consequently, if, for instance, a supernumerary lumbar vertebra between the fifth and the sacrum should occur, the symmetrical development of the spine would not be disturbed, as long as this intercalated vertebra is in itself symmetrical. That is what we see in many of Professor Dwight's specimens. So am I sure there are many individuals who have a straight spine in spite of congenital abnormalities in the lumbar or sacral region. On the other hand the theoretical supposition is justifiable, that many of these abnormalities will take place in an asymmetrical way and will disturb the symmetry of the foundation of the spine and, therefore, produce spinal curvatures, partly directly in a mechanical way, partly indirectly by compelling the body to compensation. There are already anatomical proofs that spinal deform-