ON A PECULIAR OBSTRUCTIVE FORM OF LARYNGEAL TUBERCULOSIS WHICH SIMULATES BILATERAL ABDUCTOR PARALYSIS.

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STENOSIS, though not one of the commonest, is yet, perhaps, the most important result of tubercular disease of the larynx.

In most cases this complication is the outcome of a massive infiltration, with or without oedema, of some part of the mucous membrane situated above the vocal cords.

In the form which is the subject of the present communication, stenosis occurs primarily at the rima glottidis, and depends not on the amount of swelling, but on mechanical fixation of the vocal cords in the position of phonation. I shall now give a short account of two of the six cases of this affection that I have met with.

CASE I.—J. S., aged 60, messenger, admitted under Dr. Reginald Thompson, April 20th, 1887.

History.—Gradual onset of cough and "tickling" in the throat six months ago. Two months later he noticed pain in the throat, followed by dysphagia and shortness of breath. A few weeks ago he began to spit up a little phlegm. No marked wasting.

Present Condition.—Patient is fairly well nourished. Voice clear. Marked inspiratory stridor and dyspnoea. Larynx hardly moves at all with respiration. Tracheal breathing over manubrium sterni, faintly heard also at the apex of each lung. Breath sounds generally weak.

Laryngoscopic Examination.—Much swelling of both ary-epiglottic folds. On the internal aspect of the right arytenoid cartilage a small pinkish pea-sized outgrowth. Vocal cords slightly congested and in the median position, being separated by rather less than one-eighth of an inch. No movement of the cords with inspiration. On phonation closure of the glottis ensues. (Paralysis of the dilators or fixation mainly affecting these muscles.)

Diagnosis.—Laryngeal new growth (?)

The next day tubercle bacilli were found in the sputum. "Laryngeal and probably pulmonary tuberculosis," were then diagnosed.

April 27th. Increased swelling of ary-epiglottic folds. Left edge of epiglottis swollen and irregularly ulcerated. Right arytenoid cartilage and vocal cord now completely fixed. Left cord still moves slightly towards the middle line during phonation. No movement outwards.

The dyspnoea gradually became more severe and paroxysmal. Tracheotomy was accordingly performed on May 1st, and the dyspnoea was at once relieved.

The patient's general condition, however, gradually deteriorated after the operation. The swelling of the epiglottis and ary-epiglottic folds became so great that the glottis could no longer be seen, subcrepitant *râles* were heard at the apices of both lungs, and he died on June 5th, five weeks after the tracheotomy.

Summary of the Post-mortem Examination.—Small cavities and fibro-caseous patches at the apices of both lungs. Miliary tuberculosis of the intestine and kidney. Tubercular ulceration and infiltration of the larynx and trachea.

Recurrent laryngeal nerves quite free from pressure or disease of any kind.

The mucous membrane of the larynx was extensively infiltrated, and irregularly but superficially ulcerated, both ary-epiglottic folds and the left ventricular band being especially swollen. The apex of the left arytenoid cartilage was exposed by the ulceration. A small reddish sessile tumour of the size of a pea projected from the internal aspect of the right arytenoid cartilage. Vocal cords in the median position lying almost in contact, right cord unaffected, the left superficially ulcerated, and more or less fused with the swollen ventricular band. Both arytenoid cartilages fixed, the right more than the left. Crico-arytenoid joints healthy. Crico-arytenoid postici muscles thin and pale, their fibres being interspersed with yellowish lines; this condition much more evident on the right side.

Microscopical Examination.—The muscular fibres of the crico-arytenoid postici were very indistinctly striated, some fibres being almost devoid of striation, and containing coarse

granules. In places large groups of oil globules were seen lying between the fibres. These changes were much more pronounced on the right side. The fibres of the laterales showed fairly distinct striation as a rule, but some of them were very thin and imperfectly striped. The small tumour had a well-marked tubercular structure containing giant cells and tubercle bacilli. The right ary-epiglottic fold exhibited a marked fibro-tubercular structure.

CASE II.—T. W., aged 42, admitted under Dr. Douglas Powell, April 23rd, 1888. The patient had been ailing for about ten months with cough, expectoration, and debility. Seven or eight months before admission he lost his voice, and for the last two months he had suffered from increasing dyspnoea, for which he was admitted.

Present Condition.—Slight inspiratory stridor and dyspnoea while lying still, much increased by movement. Respiratory excursion of the larynx does not exceed a quarter of an inch. Aphonia complete. At the apices of both lungs slight dulness (more marked behind), weak tubular breathing, and sonorous rhonchus. Tracheal breathing over the manubrium sterni.

Laryngoscopic Examination.—Vocal cords slightly congested and completely fixed in the median position about one-eighth of an inch apart, their surface being coarsely granular and uneven. Both ventricular bands deeply congested, the right much swollen, the left only slightly so. Slight swelling in the right arytenoid and inter-arytenoid regions without ulceration. Tubercle bacilli were found in the sputum. The dyspnoea steadily increased, and tracheotomy was performed on May 13th. Rapid improvement followed. The patient gained 10 lbs. in weight, his temperature gradually fell, and he was discharged, wearing his tracheotomy tube, on July 23rd.

In four other cases a similar condition of the glottis existed during life, tracheotomy being performed in three of them. In one case a necropsy made three months after tracheotomy showed that both cords and arytenoid cartilages had been destroyed by ulceration. In a second case the vocal cords had been separated from the arytenoid cartilages by deep ulceration extending from the ventricles, and had become attached to the cricoid cartilage in the middle line. In the two remaining patients tracheotomy was followed by death in periods of two and three months respectively, and no necropsy was obtained.

These cases prove the existence of a form of laryngeal tuberculosis in which the danger to life is out of all proportion to the degree of infiltration of the larynx or lungs. The severity of the disease depends on the persistent approximation of the vocal cords in the position of phonation. This condition of the glottis can only be explained in one of two ways, either by paralysis of the crico-arytenoid postici muscles, or by mechanical fixation of the vocal cords. The former supposition is met by the objection that although the cords lay close together, as in cases of bilateral abductor paralysis, their movements to and from the middle line were almost equally impaired.

Again, if the loss of movement were due to complete bilateral paralysis both of abductors and adductors, the vocal cords should be placed further apart, in the so-called cadaveric situation. Unequal paralysis of the two antagonistic groups of muscles, affecting the abductors to a greater degree, would supply a somewhat more probable explanation. But it must be stated that in every case the laryngoscope gave evidence of more or less infiltration in the neighbourhood of the arytenoid cartilages, and, sooner or later, of structural changes in the vocal cords themselves, facts suggestive of mechanical interference.

In Case I, the *post-mortem* examination was made five weeks after tracheotomy, and the destruction of tissues was not too advanced to allow of some insight being obtained into the causes that led to the peculiar condition of the glottis. Both arytenoid cartilages were found to be fixed, the right especially, by a firm tubercular growth which extended down to the perichondrium, without invading the cavity of the crico-arytenoid joints, which were perfectly healthy. In the presence of so obvious a mechanical hindrance to the free movement of these joints, we need hardly go any further to explain the immobility of the vocal cords. The condition of the muscles, namely, the degenerative changes in both crico-arytenoid postici, preponderating on the right side, and the less diseased condition of the crico-arytenoid laterales are important points, and deserve special attention.

It is not easy to see why the cords should have taken up the median position, for there was no appearance, either in the patient's lifetime or after death, of any dislocation of cartilages,

neither was there any cicatricial or other distortion of parts. A consideration of the relative appearances presented by the abductor and adductor muscles suggests that the effects of the pericrural infiltration were at first mainly felt by the crico-arytenoid postici, impairment of function of these muscles, aided possibly by contraction of their antagonists the adductors, leading to approximation of the cords, which became permanently fixed in their new situation in consequence of the increasing infiltration around. This sequence of events would harmonise with the clinical history, which shows that obstructive symptoms had existed for at least three months before any distinct loss of voice occurred. Horsley and Semon's experiments with the freshly-excised larynx of animals have demonstrated that the crico-arytenoid postici lose their direct electrical excitability before the laterales, and the former may therefore be considered to be the more vulnerable muscles.

Without venturing to assert that the lesion was precisely the same in every case, there can be little doubt that the want of mobility of the vocal cords was due in each instance to some interference with the crico-arytenoid articulations. The hypothesis that the affection began as an arthritis or perichondritis in the first place, seems less probable than the explanation that has been suggested, from a consideration of the symmetrical nature of the process. At the same time, however, it cannot be denied that intra-articular lesions may have existed in some of the cases where no necropsy was obtained, though the relatively slight degree of swelling, the absence of oedema in the early stages, together with the progress of the disease, would appear almost to exclude the existence of a suppurative arthritis. A non-suppurative, adhesive arthritis, on the other hand, would perfectly well account for the fixation of the cords, even if it failed to explain their close approximation, without the intervention of some such unequal muscular derangement as has been contended for in Case 1.

I am not aware that the existence of such an adhesive form of arthritis has yet been demonstrated in laryngeal tuberculosis, although its occurrence seems by no means improbable.

It may be mentioned that in none of the cases was any evidence of syphilis obtained.

Severe and abiding stenosis, the distinguishing clinical feature of all six cases, is readily explained by a consideration of its situation and method of production. In the ordinary form of obstruction resulting from massive tubercular infiltration, the degree of accompanying oedema varies considerably, and in a great measure determines the possibility of spontaneous diminution of the swelling. In the last stages of phthisis laryngeal oedema, once established, is practically always persistent; but where the disease is less advanced, inflammatory oedema complicating lesions that are not very extensive may undergo complete or very considerable absorption.

The distinction drawn between these two forms of tubercular stenosis is, therefore, of some practical importance. Paroxysmal dyspnoea occurred in several cases, and is probably to be explained by accumulation of secretion below the glottis, owing to the interference with the mechanism of cough entailed by the rigidly fixed condition of the vocal cords.

An analogous explanation of the paroxysms of dyspnoea which are apt to occur in cases of tracheal stenosis was suggested several years ago by Dr. Bristowe. Spasm of the sphincter muscles of the larynx was, in all probability, also concerned in a minor degree in the causation of these paroxysmal attacks.

The effect of the laryngeal obstruction was to mask the condition of the lungs more or less in every case, and in two instances it rendered auscultation for a time quite valueless. In both cases, however, the detection of tubercle bacilli in the sputum removed all doubt as to the nature of the disease, showing the extreme importance of examining the sputum in all doubtful laryngeal affections, especially where the existence of stenosis prevents us to a great extent from investigating the state of the lungs.

A recognition of the severe and abiding character of the obstruction points clearly to the necessity for some operative interference.

Tracheotomy was performed in five of the cases, and possibly in the sixth case the patient's life might have been prolonged for a brief period by this means. At the same time, when we regard the results of the operation, it cannot be said that they are satisfactory, though in all five instances in which tracheotomy was performed it was undeniably called for, and prolonged life. The longest period that any patient survived was six months. (This

patient was still living when he was last heard of.) The other patients lived from six weeks to three months after the operation.

In one case the question of thyrotomy and excision of the posterior parts of the vocal cords was considered, as the man's general condition at first was fairly good. Destruction of the posterior extremities of the cords by means of the galvano-cautery was also suggested; but the fear of exciting inflammatory oedema and spasm with such a narrow glottis negated this idea. Intubation appeared to offer slight hopes of success owing to the rigidly fixed state of the vocal cords. In consequence of the patient's objection to any operation whatever, valuable time was lost, and, when impending asphyxia rendered tracheotomy imperative, the man's condition had deteriorated to such an extent that all notion of a radical operation was abandoned. Enough has been said to prove that tracheotomy was inevitable in the cases described; but, at the same time, it must be allowed that serious objections exist to the performance of this operation for the relief of laryngeal tuberculosis if it can by any means be avoided. I have endeavoured to draw attention to this subject in a paper published in the *Lancet* in 1888.

Where stenosis of the larynx is caused mainly or entirely by fixation of the cords near the middle line thyrotomy and excision of parts of the rigid cords would be a justifiable procedure, if we could satisfy ourselves that there is comparatively little disease of the lungs. The danger of necrosis of cartilages is, no doubt, very great in tuberculous patients, but this complication is less likely to be produced by simple splitting of the thyroid cartilage than by the persistent irritation of a tracheotomy tube.

Whether thyrotomy or tracheotomy be preferred, there can be little doubt that, as soon as this affection is recognised, some operative interference is urgently needed. We have, in fact, to deal with a condition similar to that existing in bilateral abductor palsy with this exception, that, in the case with which we are now concerned, stenosis of the glottis is due, not to paralysis, which may possibly be temporary, but to permanent mechanical causes. The indications for the operation of tracheotomy, so well expressed by Dr. Felix Semon, in vol. xii of the *Clinical Society's Transactions*, apply, consequently, with even greater force to the present affection.

Until quite recently, I was unaware that any similar observations had been recorded. I find, however, that Messrs. Cornil, Héard, and Hanot, at page 587 of the second edition of their work, *La Phthisie Pulmonaire*, published in 1888, mention a case, communicated to them by Brissaud and Ruault, in which double tubercular crico-arytenoid arthritis simulated bilateral paralysis of the dilators of the glottis.

The laryngoscope showed a very marked oedematous swelling of the arytenoids and of the ary-epiglottic folds, the vocal cords lying close to the median line, and being quite devoid of movement. Auscultation of the lungs gave a negative result. Death occurred during a suffocative attack, just after tracheotomy had been commenced.

At the necropsy a few tubercular granulations were found at the apices of the lungs, and the examination of the larynx, conducted by Ruault in the presence of Professor Cornil, revealed a diffuse tuberculous infiltration without ulceration. The vocal cords occupied the median position. Both crico-arytenoid joints were diseased, and were filled with pus.

Histological examination proved that the disease was a tubercular arthritis.

This observation is most interesting, as it supplements those that have already been narrated. In this case it is not improbable that the mechanical effects of suppuration within the crico-arytenoid articulation were associated subsequently with a direct myopathic paralysis or paresis of the crico-arytenoid postici and arytenoideus from extension of the inflammatory process to these muscles, which, from their close proximity to the affected joints, would be specially exposed to such an accident.

The general effects of loss of function of these muscles would be to contribute to the median position of the vocal cords, for, although paresis of the arytenoideus and crico-arytenoid postici would, to some extent, neutralise each other, the more important adductors, the crico-arytenoid laterales, being uninjured, could hardly fail, in virtue of their muscular tonus, to approximate the vocal cords when unopposed by the action of their antagonists, the abductors.

On reference to Dr. Semon's excellent and exhaustive article on "Mechanical Impairments of the Crico-arytenoid Articulation,"¹

¹ *Med. Times and Gaz.*, 1880, p. 5 of reprint.

to which I am very much indebted, it will be seen that he says of this joint: "Even minor degrees of mechanical impairment of its mobility might produce serious troubles in phonation, whilst the complete bilateral true or spurious ankylosis of the arytenoid cartilages in that position which they occupy in phonation might directly cause the death of the patient, by the complete occlusion of the glottis which results from juxtaposition of these cartilages." This shows that Dr. Semon fully recognised the possible occurrence of a stenosis of the glottis under conditions similar to those with which we are now dealing, though he does not connect this lesion with the tuberculous process.

On the other hand, Case I of the present series actually demonstrated the existence of a secondary adhesive perichondritis, and consequently supports Dr. Semon's contention, arrived at on other grounds, that perichondritis is not invariably suppurative, but may assume a plastic or adhesive character.

Koch² says that complete ankylosis of the crico-arytenoid articulations may show the same laryngoscopic appearance as bilateral abductor paralysis. M. Schmidt³ hints at the possibility of a similar occurrence in phthisis. But none of these authors give particulars of a case, and it remains uncertain whether they have actually observed this condition of the glottis in laryngeal tuberculosis themselves.

It appears, then, from the cases that form the subject of the present communication, as well as from the observation of Brissaud and Ruault above quoted, that fixation of the vocal cords in the median position, simulating bilateral abductor paralysis, may occur in tubercular disease of the larynx, as the result of three different causes:—

1. Plastic infiltration around the arytenoid cartilages leading to adhesive perichondritis and spurious ankylosis.
2. Ulceration, followed by morbid adhesion of the altered vocal cords.
3. Suppurative crico-arytenoid arthritis.

To these causes it may be necessary to add a fourth, if, as is not improbable, further investigations should demonstrate the existence of a non-suppurative adhesive arthritis.

In all cases of this description the performance of tracheotomy, or some other surgical measure, is indispensable, and should not be long delayed; consequently the early recognition of this condition is a matter of no small clinical importance.

CASE OF SUPPURATIVE LARYNGEAL PERICHONDritis, WITHOUT ANY ANTECEDENT DISEASE IN THE LARYNX.

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SO-CALLED primary laryngeal perichondritis, or, more correctly, perichondritis without any previous affection of the larynx, is so rare that I think it right to place on record the following case, which came under my notice a few months ago at the Glasgow Royal Infirmary.

Mrs. B., a Greek, aged 45, was admitted to the throat ward on October 19th, 1889, complaining of hoarseness, inspiratory dyspnoea, and cough. On inquiring into the history of the case, it was discovered that about three weeks previous to admission the patient had several rigors, and shortly afterwards she experienced slight pain in the throat. This illness she attributed to having slept in a damp bed while residing in the country. A week after the first rigor she noticed that her voice was not so clear as usual, and she suffered from difficulty in breathing. The hoarseness and dyspnoea gradually increased till she applied for admission to the hospital, and for two days previous thereto these symptoms were associated with a moderate cough and expectoration. In respect to personal history, nothing of any importance could be made out. She has always been strong and healthy, and never suffered from any throat or chest affection.

On admission, the patient was seen to be suffering from great difficulty in breathing, associated with noisy stridulous inspiration, but expiration was comparatively quiet. The respirations

were twenty per minute. Cough was not very troublesome, but there was considerable and profuse frothy mucous expectoration. At this time an examination of the chest was impracticable on account of the extremely noisy breathing. When I saw the patient next morning I found her sitting up in bed, her pulse weak, and temperature normal; the inspirations were very noisy, but to all appearance the patient was receiving into her lungs a sufficient supply of air, the voice was very hoarse and high pitched, and the cough somewhat stridulous. A laryngoscopic examination could not be made satisfactorily till October 21st, two days after admission, when the following condition was noted. "There is a marked oedematous swelling of the mucous membrane covering the arytenoid cartilages and the false cords, so that only a narrow chink is left between them. During inspiration this opening is apparently not, but must in reality have been, more than one-twelfth of an inch wide, and its edges are thrown into vibration by the ingoing current of air. Upon expiration the opening becomes wider, and permits of free exit of air. This change is most marked upon the left side, the false cord being drawn away from the middle line, so that a view is obtained of the left vocal cord. The left vocal cord is seen to be fixed in the middle line, but no view can be obtained of the cord on the right side."

On November 1st the respiration, although still noisy, was considerably improved, so much so indeed that the patient was very anxious to go home. An examination of the larynx showed the oedema of the mucous membrane to be greatly reduced, but still there was considerable swelling on both sides of the larynx. The patient was therefore strongly advised to remain in the ward; but, notwithstanding this advice, she left the hospital in the afternoon.

A physical examination of the chest made during her residence in the ward showed her lungs to be normal, but the heart was very weak, the area of cardiac dullness increased, but no murmur was present.

On November 25th, a daughter of the patient came to the throat dispensary and informed me that her mother had been very ill for the last three days, and from her description the patient must have had several severe attacks of paroxysmal dyspnoea, probably due to laryngeal spasm. I therefore asked my assistant, Dr. D. McKellar Dewar, to see the patient at her own home for the purpose of ascertaining if the patient was in a fit condition to be removed to the hospital, which he kindly did on the same day. Dr. Dewar, on making a careful examination, found the patient too weak to be disturbed, and he was also satisfied that the obstruction to respiration was not greater than when she left the ward, but it was evident to him that the cardiac weakness had become more threatening.

The patient died suddenly on November 28th, and her friends said that she passed "quietly away" without manifesting any signs of dyspnoea. The friends objected to a *post-mortem* examination, and with considerable difficulty Dr. Dewar got permission to examine the larynx only. The following is his report:—"The appearance of the larynx before cutting open confirms the laryngoscopic view, but adds nothing to it. On splitting up the cricoid cartilage from behind and opening the larynx the posterior surface of the cricoid cartilage is seen to be distinctly eroded a little to the left of the posterior middle line. The right cord is nodular, and immediately below it there is an opening into an abscess cavity of small dimensions, which reaches down the trachea for about half an inch. In addition to the oedema, the mucous membrane of the whole larynx is injected."

REMARKS.—The case just described is peculiar (1) in the obscurity of the disease, the symptoms not being those usually met with in perichondritis, and (2) in so far that there was no apparent cause for what might, by some observers, be regarded as a spontaneous suppuration between the perichondrium and the cricoid cartilage.

(1). In perichondritis of the cricoid cartilage the presence of pain on deglutition is usually complained of by the patient, owing to the irritation produced by substances swallowed. The lymphatic glands in the neck generally enlarge early in the course of the case; there is swelling in front of or around the larynx; and, as a rule, external palpation of the cartilages with the hand produces crepitation, and causes the patient considerable pain; the expectoration contains pus, or purulent mucus may be seen occupying the larynx. In this case none of these symptoms were present. On the other hand, the inflammation of the cricoid cartilage evidently impaired the movement of

² *Annales des Mal. de l'Oreille et du Larynx*, No. 6, quoted by Semon, p. 14 of reprint.

³ *Deutsch. Arch. f. kl. Med.*, Bd. 26.