MORGAN, (E. C.)

Sarcoma of the larynx.

occurrence may be found in the fact that, as Heinze[16] shows, the tubercular deposit attacks and destroys the coats of the veins, while the outer and inner coats, only, of the arteries are destroyed. We thus have the conditions favorable to the development of œdema. When it does occur, it is the arytenoid and ventricular bends which are generally involved, and of these the point of selection is where the morbid process has progressed farthest. The epiglottis is very rarely the seat of œdema. When it occurs, it becomes a most distressing and intractable symptom, rarely yielding to treatment, but demanding tracheotomy. Paralysis of the abductors is often reported as occurring in phthisis of the larynx; it is very doubtful if genuine paralysis ever occurs in this disease. The tubercular process is very slow to attack the laryngeal muscles, as shown by Holmes,[21] and what has been called paralysis is really a destruction of the crico-arytenoid joint by invasion of the disease, whereby its mobility is destroyed. This may involve one or both joints, and may leave them motionless in any position. If they are anchylosed in a state of abduction, of course, the symptoms are not grave, but if the fixation occurs with the cords approximated the complication is a most serious one. If one cartilage alone is involved, the breathing space is notably, if not seriously, encroached upon. If both cartilages are fixed in adduction, we have the same condition which constitutes the gravity of genuine bilateral paralysis of the abductors. Why the fixation should occur in such a position as to produce dyspnœa is not easy of explanation. Anchylosis is by no means uncommon in laryngeal phthisis, but bilateral anchylosis leaving the cords in a state of adduction is happily very rare. The symptoms of this accident come in rather suddenly, and demand rapid relief by tracheotomy.

TREATMENT.—In former days caustics figured prominently as a local application to laryngeal ulcer, as to all forms of ulcerative disease. The first effect was exquisite pain, followed by a few hours of relief, but the ultimate result was harm, rather than good. Most writers are united now in regarding as the best treatment for this distressing disease that which is the mildest and least irritating. A better rule, perhaps, to lay down would be, never to make any application to a phthisical larynx which causes pain. A systematic method of treatment on this plan would involve four steps, as follows:

1. The thorough cleansing of the parts, preparatory for the more special application.

2. The application of a mild, unirritating astringent, to control secretion and reduce congestion of the mucous membrane.

3. The application of an anodyne, both to relieve pain, and as a valuable remedial agent in this disease.

4. The application of iodoform, as possessing specific properties in controlling ulcerative action.

The first indication may be best carried out by using a solution of borax, or even common salt, but perhaps the best cleansing solution we have is that which is known as Dobell's solution. The formula is as follows:

℞. Acidi carbolic..... gr. iv.
Sodæ bicarb..... gr. xv.
Sodæ biborat..... gr. xx.
Glycerinæ..... ℥ vj.
Aquæ..... ad ℥ vj.
M.

This is best applied with the compressed-air apparatus and Sass's spray-tubes, a slight jet being thrown in and repeated at short intervals. The application should be regulated according to the condition of the patient, and should cause no irritation. In the absence of the compressed-air apparatus, the small hand-ball atomizer known as the Magic may be employed. Following this, an astringent should be used. One of the following, in the order of preference, will be found useful: Tannin, gr. x. to ℥ j.; zinci sulphat., gr. iv. to ℥ j.; argenti nitrat., gr. j. to ℥ j. The selection should be governed by the effect. The next step is the application of morphia. This should be used in solution rather than in powder. Morphia seems to not only relieve pain in the larynx, but to exercise a certain controlling action on the progress of laryngeal phthisis. In using it, however, it is always to be borne in mind that a systemic effect is produced by an application to the fauces as quickly as when the drug is introduced into the stomach, and care must therefore be exercised in its use. Keeping this in mind, about ten minims of an eight-grain solution may be thrown upon the diseased surface. If there is any difficulty in making the morphine application, it may be combined with the iodoform, which is to be applied next.

In applying iodoform, care must be exercised to evenly distribute a very thin layer over the ulcerated surface. This is best done with Robinson's powder-blower, using the finely powdered iodoform always.

If the morphia has not been applied in solution, it may be used as follows:

℞. Morphiæ..... gr. x.
Tannin..... ℥ j.
Pulv. amyl..... ℥ jss.
Iodoform..... ℥ ijss.
M.

The above system of treatment is for the stage of ulceration; for the earlier stage the same plan may be carried out, with the exception of the iodoform. The applications must be made every day, and if patience and care be exercised it will be found that what has been heretofore regarded as an incurable disease may be very markedly relieved in all cases; and that many patients may be entirely cured of this most distressing complication of pulmonary disease.

In addition to the above plan there is one remedy which a patient with laryngeal phthisis must never be without, and that is cocaine. The painful symptoms attendant upon the disease, especially the painful deglutition, are so harassing that they react in no small way upon the patient's general condition. The cocaine, locally applied, will procure freedom from pain for about fifteen minutes—long enough to enable the patient to eat and drink with ease, an aid to recovery the value of which is not to be underestimated. Every patient should keep a small Delano atomizer, with a four per cent. solution of cocaine, and make the application as needed.

The constitutional treatment of the disease is the same as that of pulmonary consumption, and need not be entered upon here. There are no constitutional remedies which possess any specific properties in throat consumption.

Francke H. Bosworth.

[1] De Sedibus et Causis Morborum, lib. xv., 13, 14. Lugdunum Bat., 1767. [2] Dissertatio de Phthisi Laryngea. Montpellier, 1790.
[3] Recherches sur la Phthisie Laryngée. Paris, 1802.
[4] Recherches sur la Phthisie. Paris, 1825.
[5] Traité de la Phthisie Laryngée. Paris, 1827.
[6] Clinique Médicale, t. iv., p. 183. Paris, 1830.
[7] Dictionnaire de Méd. et de Chir., 1834, art. Laryngite.
[8] Die Kehlkopfkrankheiten, p. 261. Berlin, 1861.
[9] Archives Générales de Médecine, t. v., p. 142. Paris, 1839.
[10] Mémoire sur la Phthisie Laryngée, p. 20. Paris, 1840.
[11] Handbuch der Pathologischen Anatomie, Bd. v., p. 435. Wien, 1846.
[12] Klinik der Krieslaufs und Athmungsorgane, p. 388. Breslau, 1856.
[13] Die chronischen Kehlkopfkrankheiten, p. 65. Berlin, 1866.
[14] Vorlesungen über Geschwülste, Bd. ii. Berlin, 1865.
[15] Dictionnaire des Sciences Médicales, art. Larynx. Paris, 1868.
[16] Die Kehlkopfschwindsucht, nach Untersuchungen im pathologischen Institute der Universität, Leipsic, 1879.
[17] Pathologische Anatomie des Larynx und der Trachea. Berlin, 1880.
[18] Diseases of the Throat, vol. i., art. Laryngeal Phthisis. London, 1880. [19] Prager Vierteljahrsschrift, 1856, Bd. xiii.
[20] London Lancet, February 27, 1875.
[21] Ibid., August 25, 1883, p. 323.
[22] New York Medical Record, May 17, 1879, p. 424.

LARYNX, SARCOMA OF THE. Primary sarcoma of the larynx is a rare disease, and occurs oftener as the intrinsic than as the extrinsic variety. Butlin, in his exhaustive and systematic treatise, to which the reader is referred for fuller details, has collected only twenty-three cases of primary sarcoma of the larynx.

The distinction established by Krishaber of intrinsic and extrinsic tumors, as applied to the larynx, also has significance in sarcomatous disease of this organ. Spindle-celled, round-celled, giant-celled, and mixed-celled, as well as the compound tumors, fibro- myxo- and lympho-sarcoma, are recorded as occurring primarily in the

larynx. The spindle- and round-celled growths are encountered most commonly; the latter oftener than the former, according to the writer's investigation.

Sarcoma ordinarily attacks robust persons between the ages of twenty-five and fifty years, as is shown by the accompanying table prepared by Butlin:

	Patients.		Patients.
7 years	1	51 to 60 years	4
24 to 30 years	3	61 to 70 years	1
31 to 40 years	6	74 years	1
41 to 50 years	5	Uncertain	2

About eighty per cent. of those attacked are males. Profession and occupation exercise no marked influence in causing the disease, although exposure to cold, the abuse of alcohol and tobacco, as well as violent use of the vocal organ, may act as inviting causes.

Some contend that hereditary influence, traumatism, and the degeneration of papillomata are causes of sarcoma, but the writer ventures to express his candid disbelief in the existence of sound clinical proof to sustain such opinions. In short, the origin of primary sarcoma within the larynx is quite as obscure as is its source in general. The vocal and ventricular bands of the left side are the favorite points of origin of these growths in intrinsic sarcoma; the epiglottis in extrinsic sarcoma. These tumors rarely attain dimensions larger than an English walnut, usually are single and of smooth appearance, though at times nodulated or dendritic.

Symptoms.—These are similar in most particulars to those of carcinoma of the larynx, although, as a rule, milder in degree and more gradual in development. Phonation, respiration, and deglutition are interfered with in a degree varying with the location of the primary lesion, its size, mode of attachment, and stage of progress.

Hoarseness may exist for years prior to the development of the disease, but is a constant and important symptom. The voice is at first uneven, irregular, and finally shrill, but is rarely entirely and permanently extinguished. The degree of dysphonia may bear no relation to the dimensions of the intra-laryngeal tumor, great vocal changes resulting from the smallest swellings, even in the earliest stage of the disease. The infiltration of sarcoma soon interferes with the mobility of the intra-laryngeal muscles, and dysphonia results. It may be here stated that in benign neoplasms of equal size the movements of the vocal bands are not thus impaired.

Embarrassed respiration, dependent upon tumefaction of laryngeal tissues and consequent stenosis, always occurs. At first respiration is slightly impeded, the patient noticing the impediment upon making slight muscular exertion, but ultimately the laryngeal dyspnœa threatens life and requires the opening of the trachea. The patient finds it often impossible to assume the recumbent posture, and loses sleep and strength. In rare instances the subjective symptoms are so slight that a sarcomatous growth may attain dimensions sufficient to cause death from suffocation before the patient applies for medical advice. A striking instance of this kind is reported by Dr. Louis Jurist, the patient, a gardener, sixty-five years of age, dying forty-eight hours after his first examination, and twenty-four hours after refusing to have a tracheotomy performed.

Deglutition is interfered with in extrinsic sarcomata, particularly if the epiglottis is first invaded. It becomes necessary at times to sustain the patient by means of food introduced through an œsophageal tube, as swallowing is intolerable. Dysphagia may be absent or slight in intrinsic sarcomata.

Pain is by no means a constant accompaniment of sarcoma, although at times it is very severe. Pressure over the laryngeal region may elicit a tenderness. The pain radiates from the larynx to the ear, the fibres of the superior laryngeal nerve conducting the irritation through the auricular branch of the pneumogastric.

The *cough* is primarily of a dry, barking, irritative nature, but later it becomes loose. The expectoration becomes fetid, occasionally containing fragments of detached growth and blood-clots.

Hæmorrhage occasionally happens during the ulcerative period, and may be copious.

The flow of *saliva* is nearly always increased.

Diagnosis.—Sarcoma may be mistaken for benign or other malignant growths, for syphilis and tuberculosis; hence the differential diagnosis is often difficult.

Sarcoma is generally single, consisting of irregular masses of a smooth or nodulated aspect, having a broad, hard base. Its surface is occasionally dendritic, and the adjacent mucous membrane may be either anæmic or of a deeper red than normal. There is nothing in the laryngoscopic appearances of sarcoma which would warrant its differentiation from carcinoma, and the diagnosis must be established from other symptoms.

The *lymphatic glands* are not involved in sarcoma, and Butlin regards this as an important clinical fact.

When possible, a small fragment of the suspected sarcoma should be extracted by cutting-forceps and subjected to thorough histological examination, which enables us to differentiate sarcoma from other malignant growths, as well as from papillomata.

Great caution should be exercised in its differentiation from *syphilis*—the previous history or the coincidence of other syphilitic manifestations will assist in the diagnosis. There is no characteristic difference in the appearance of the sarcomatous ulcer as distinguished from that of syphilis; the former is, however, generally solitary and confined to one side of the larynx. A mixed antisyphilitic treatment may serve to clear up the diagnosis.

The diagnosis of sarcoma from *tuberculosis* is not so difficult, the age of the patient, the presence of the physical signs of pulmonary tuberculosis, and the anæmia of the laryngeal mucous membrane all assist in defining the nature of the malady under treatment.

Prognosis.—Always fatal, by apnœa or asthenia, in cases in which there is no radical or surgical treatment.

Much may, however, be done in the direction of prolonging life and palliating symptoms, both by medical treatment and tracheotomy. That an early laryngectomy has been followed by good results in primary laryngeal sarcoma is undoubted, but the future will decide the exact merits of the operation. In those cases in which the disease is extensive and of long duration, little can be expected in the direction of a radical cure by any operation; but when the disease is intrinsic, unilateral, and there is but slight infiltration, recurrence is not apt to take place after complete extirpation of the sarcoma. The prospects of cure are, *cæteris paribus*, assuredly far brighter in laryngectomy for sarcoma than in laryngectomy for carcinoma.

Bottini operated upon a male patient, twenty-four years of age, for sarcoma, on February 6, 1875, completely extirpating the larynx. This patient held the position of mail-carrier between Miazzina and Trabaro, in Italy, in 1878, and was living eight years after the operation. One of Foulis' cases lived seventeen and a half months after laryngectomy, Caselli's case two years, F. Lange's seven months, and Arpad Gerster's one year. The duration of life after unilateral laryngectomy for primary sarcoma of the larynx is as follows: Gerster's case lived one year, and died of pleurisy; there was no recurrence. Küster's case is reported as cured, but definite information is inaccessible to the writer. Excellent statistical tables of partial and complete laryngectomies have been prepared by M. Mackenzie, Foulis, Blum, Burow, Hahn, Baratoux, and Cohen. The number of recorded laryngectomies (partial and complete) at this writing is about one hundred and twenty-five.

Course and Termination.—Sarcoma, as a primary disease affecting the larynx, is generally slow in its course, and the malady is usually of from one to two years' standing when the patients seek medical aid. The termination, if there has been no surgical interference, is generally from suffocative apnœa, resulting from laryngeal stenosis; but, in the tracheotomatized subject, death most frequently results from exhaustion or pyæmia. Extensive perichondritis, secondary abscesses, and destruction of the cartilaginous structure of the larynx are liable to take place during the ulcerative period of the disease.

The destruction and disintegration of the soft tissues and cartilaginous framework of the organ may be so extensive as to result in the formation of fistulous communications between the air- and food-passages, as well as in the expectoration of necrosed cartilages.

TREATMENT.—The treatment of primary sarcoma of the larynx is extremely unsatisfactory. It may be divided into *palliative* and *radical measures*.

The *palliative treatment* includes, in addition to proper systemic medication, the topical treatment of the larynx through the natural passages and the early performance of tracheotomy.

The *systemic management* of malignant disease is fully considered in another portion of this HANDBOOK, and the necessary topical measures have been already discussed in the article on Larynx, Carcinoma of.

Tracheotomy should be done early in the course of sarcoma—on the first symptoms of dyspnœa occurring, and before the strength of the patient is reduced from insufficient oxygenation. Always, as in carcinoma, the tracheotomy should be made as far from the seat of disease as possible, and life may be thereby prolonged from one to four years.

Radical treatment comprises intralaryngeal extirpation, thyrotomy, subhyoidean pharyngotomy, and partial or total extirpation of the larynx.

Mackenzie, Navratil, and Tuerck report cases of primary sarcoma of the larynx radically cured by intralaryngeal operation; but in the writer's opinion there is great doubt about the propriety of relying upon such a procedure in growths possessing the infiltrating tendencies of sarcomata. Again, the tumor is not always either well defined or circumscribed. Butlin questions the accuracy of the above cures. He further says, in most instances it is necessary to do more than remove the seat of attachment of the sarcoma, and that a tolerably wide area of the surrounding parts, even when these present a perfectly healthy aspect, must be removed.

Thyrotomy has not been attended with favorable results, and the weight of opinion, including Bruns', is decidedly opposed to its performance. It might be successful where the disease was limited to one vocal band, if a thyrotomy were performed, the band removed, and the surrounding tissues carefully cauterized (see article Tracheotomy).

Subhyoidean pharyngotomy is only to be resorted to when the epiglottis is the seat of the sarcoma, and it therefore has a limited scope of usefulness (see article Tracheotomy).

Total Extirpation.—Upward of twelve total extirpations have been performed for sarcoma of the larynx, and among them is Bottini's famous case, already referred to in this article.

In the writer's judgment, the future usefulness of this operation will be chiefly limited to the treatment of disease of a sarcomatous nature, and then at an early stage of its existence. A small commencing sarcoma, circumscribed, slightly infiltrated, and occurring in an otherwise vigorous patient, would certainly offer every chance of a radical cure if subjected to complete extirpation. Increased experience and reliable statistics are urgently needed to settle the propriety, not to say the justifiability, of complete laryngectomy, and the near future bids fair to furnish the same.

Cohen says: "Taking for granted, as we are bound to do, that death was imminent in the above cases [those of Bottini, Caselli, and others] when the extirpation was resorted to, we have a considerable prolongation of life in every instance, and a remarkable prolongation in two."

As far as our limited statistics go, therefore, the operation of extirpation of the larynx, in hopeless cases of sarcoma, is worthy of the serious consideration of the surgeon.

Consult articles Larynx, Carcinoma of, and Laryngectomy for further information regarding this operation.

Partial Extirpation.—A very small number of partial laryngectomies are recorded in medical literature, too few to furnish a basis upon which to found any conclusions of practical value. Hahn has claimed that partial excision for carcinoma was followed by as few recurrences as was total excision. But while this may be true of carcinoma, the characteristic tendency of sarcoma to infiltrate renders the operation of doubtful utility (consult article on Laryngectomy).

NOTE.—For the literature of primary sarcoma of the larynx, and illustrations of the same, consult article "Larynx, Carcinoma of."

Ethelbert Carroll Morgan.

LARYNX, STENOSIS OF THE (Stricture of the Larynx, Contraction of the Larynx). Stenosis of the larynx may be defined as that condition of the organ in which its calibre is diminished to such an extent as to interfere with respiration and endanger life. It may result from causes within the larynx or external to it.

Before the introduction of the laryngoscope little was known of this condition. Here and there in medical literature some cases of contraction of the larynx are reported, occasionally treated intelligently, as in Liston's case in 1828, where the obstructed larynx was dilated after a tracheotomy. Bouchut also, in 1858, and Horace Green, about the same time, taught that with the larynx constricted by œdema or croup, life could be preserved by the introduction of a tube; but such remedial measures were looked upon with disfavor by the authorities of the day, and it was reserved for later observers to define the causes which produce this condition, to demonstrate its location and appearance, and to devise means for its relief.

Among the first to operate for stenosis by the aid of the laryngoscope were Marduel in 1863, and Delore in 1864. Since then Stoerck, Schroetter, Mackenzie, Tuerck, Weinlechner, Elsberg, Koch, Hering, and many others have contributed to the literature of the subject, and have added to the knowledge of its method of treatment.

Stenosis of the larynx may be classed, according to its anatomical seat, as supra-glottic, glottic, or infra-glottic, as proposed by Tuerck, or it may be studied according to the cause producing it.

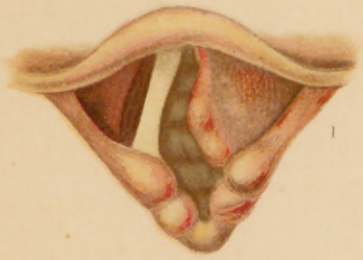
The causes producing stenosis are:

1. Cicatrices following the healing of ulcers, or the formation of bands abnormally uniting different parts of the larynx. This condition we find as the result of constitutional disease, as syphilis, phthisis, and glanders, after wounds of the larynx, and following burns and scalds.
2. Inflammation, acute or chronic, the result of which is to produce obstruction of the larynx. Croup, diphtheria, œdema, perichondritis, and chronic stenosing inflammation are included under this head.
3. Neoplasms, where the obstruction is caused by the presence of growths, benign or malignant.
4. Neuroses, causing spasms or paralysis.
5. Compression of the larynx from external causes.

It is evident that, in order to intelligently treat this condition, its cause must be ascertained. Of course, in all cases where asphyxia is impending operative interference is demanded; but the method of operating, and the measures to be adopted after the emergency has passed, must depend entirely upon a knowledge of the cause producing the obstruction.

The laryngoscopic appearance of a stenosed larynx naturally varies with the character of the obstructing element. In œdema, from whatever cause, we have a smooth, shining swelling, differing in color according as it is produced by acute inflammation, tuberculosis, or Bright's disease. In syphilis we have a ragged, deformed, irregular larynx, sometimes filled with vegetations, and sometimes obstructed by membranous bands and adhesions; in cancer we find ulcerated masses, sanious and vegetating; in perichondritis the deformed condition of the larynx and the presence of abscess point to the nature of the disease, while the appearances of polypi and of spasm or paralysis are at once apparent on examination.

The symptoms of stenosis are those of obstructed respiration. At first there is but slight interference with breathing; there is a hissing sound in inspiration which gradually becomes stridulous, and in some cases is characteristic. Fauvel claims to recognize cancer of the larynx by the peculiar reedy sound of the respiration. Later on appear symptoms of extreme dyspnœa, which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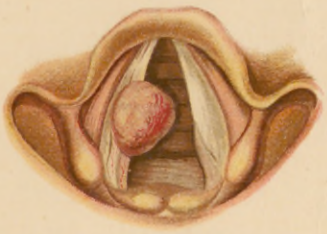
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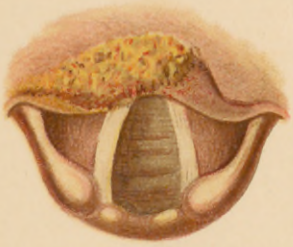
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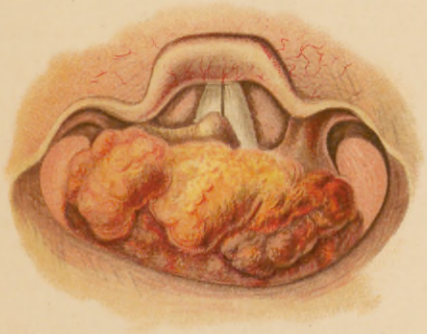
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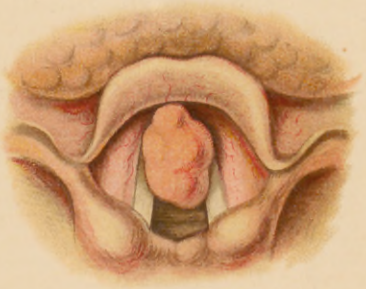
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CARCINOMA AND SARCOMA OF THE LARYNX.

H. BENCKE, LITH. N. Y.