

and those portions of the larynx which normally have pavement epithelium, but also in other regions covered with columnar epithelium, as, for instance, the ventricular bands or ventricles. In these latter situations we may see a transition from columnar to pavement epithelium.

On the free surface of the vocal cords in pachydermia there occur, in addition to the normal folds, actual papillae which may penetrate farther into the thickened epithelium than the level of the normal folds. These are particularly well developed in the region of the vocal processes. While the connective tissue thus sends papillae into the epithelium, the epithelium in turn penetrates the connective tissue with interpapillary prolongations which may be divided into several summits.

The subepithelial layers of the connective tissue exhibit an increase in the number of round cells, particularly in the neighborhood of the glands. The cells may penetrate the cylindrical epithelium of the latter and fill the lumen of the efferent ducts. Keratohyalin is apt to occur together with the formation of papillae, giving the tissue an epidermoid character.

The origin of the depressions at the summit of the pachydermal swellings on the vocal process is not wholly clear. In cases which have been investigated histologically the depression in the centre of the swelling is seen to correspond exactly to the point of the hyaline cartilaginous process. This latter is hypertrophied connective tissue, which, around the point of the cartilage, is prolonged upward into papillae that are covered with a thick layer of pavement epithelium forming the margin of the growth in question. Virchow believes that the depression occurs by reason of the closer approximation of the mucous membrane to the point of the cartilage in the centre of the growth than at its periphery. Fraenkel explains it by the mutual pressure exerted by the vocal processes during phonation.

Ulceration is apt to occur in pachydermia in most cases of long duration. It begins in all cases from the surface, and perhaps is initiated by the rubbing of the apposed portions of the mucous membrane on each other. Perichondritis may be observed in association, but its relation to the ulcerative process is not clear. It is possible that some of the cases reported owe the origin of these processes to tuberculous, syphilitic, or typhoid infections. It is possible that both Virchow's and Fraenkel's views are correct.

Prognosis.—This is not hopeful, for there is so much structural change that it seems almost impossible that the larynx should ever return to its normal condition. Whether the x-rays may not at some future time reduce these hyperplastic growths, as they have done in cases of sarcoma and papilloma of the larynx, remains to be seen.

Treatment.—In my hands the cautery has had to be used with great caution, for this condition seems prone to take on acute inflammation rapidly, and the possibility of an acute inflammation supervening on the chronic thickening cannot be overlooked.

Astringent applications do some good if they are not too strong and are used after spraying with cocaine. I think perhaps I have obtained the best results from insufflations of protonuclein powder. The employment of this remedy is of course entirely empirical, for there seems to be no reason why a tissue builder should be indicated in a case of exuberant growth.

There have been temporary good results from touching the growth carefully with chromic acid—just a crystal fused on a protected probe. This can be used with more certainty than the galvano-cautery knife.

Thomas Amory De Blois.

LARYNX, DISEASES OF: ARTHRITIS AND ANKYLOSIS OF THE CRICO-ARYTENOID ARTICULATION.
—**DEFINITION.**—Arthritis of the crico-arytenoid articulation is an inflammation of the joint, usually involving the perichondrium and adjoining tissues. Ankylosis is a partial or complete immobility of the joint from the formation of adhesions and the organization of an inflam-

matory exudate, usually in consequence of a previous arthritis.

ETIOLOGY.—The most frequent cause is perichondritis, the various types of which are described under that name. Quite rarely, "cold" and vocal abuse influence infection. It may be due, in either the acute or the chronic form, to rheumatism, gout, and the condition termed arthritis deformans. It is liable to follow either internal or external traumatism. It may be due to metastasis of the specific infecting organism in typhoid and other fevers, conjoined usually with secondary pyogenic infection, and it may arise by continuity of tissue in phlegmonous laryngitis and diphtheria. The crico-arytenoid joint may become stiff or even ankylosed from prolonged immobility in vocal-cord paralysis. The most frequent of all causes, however, is perichondritis due to syphilis, tuberculosis, or carcinoma.

PATHOLOGY.—In the milder forms of acute idiopathic arthritis ascribed to "cold," vocal abuse, and laryngitis submucosa, and more particularly in the rheumatic types, the serous exudation usually proceeds to resolu-

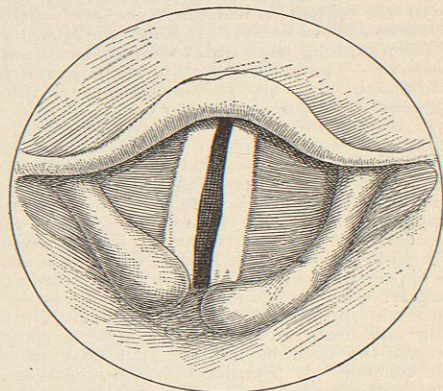


FIG. 3119.—Ankylosis of Right Crico-arytenoid Articulation. (Dr. Casselberry's Case.)

tion and absorption without suppuration, although more or less ankylosis is liable to result, presumably from the formation of adhesions. The infiltration of syphilis may attack directly the cartilages and perichondrium, and tuberculous arthritis analogous to the white swellings of the larger joints is a possibility; but usually in these types, as well as in typhoid fever and septic cases, a secondary infection by pyococci occurs through ulceration of the soft parts, and this results in an abscess, necrosis, and exfoliation. Of course if the joint is involved in the destructive process ankylosis ensues. Oedema, which is a prominent feature of the acute stage, is replaced in the chronic state by a cellular infiltration leading to tumefaction of the overlying parts.

SYMPTOMS.—Acute arthritis will occasion febrile symptoms, hoarseness, and local discomfort. Swallowing is painful, and if there is much oedema or swelling respiration may be seriously obstructed. Chronic ankylosis may be manifested only by impairment of the voice, although if it is double the dyspnoea is liable to be serious, especially during acute exacerbations. The writer has recorded a case of this sort under the name of "arthritis deformans of the larynx."

Laryngeal Image.—The aspect and more pronounced symptoms of arthritis will be found in detail under the title of perichondritis, so that only the appearance presented by the resulting ankylosis, which is of special value in diagnosis, need be here noted. The vocal cord is more often fixed in the cadaveric position (Fig. 3119), in which event on phonation the opposite movable cord will make a supplementary excursion across the median line to meet the fixed cord, producing an oblique distor-

tion of the larynx. On deep inspiration the fixed cord fails to abduct. The voice is weak and hoarse although not necessarily lost. Next in order, the cord is found fixed in or near the median line, when the voice will be but little altered; and quite rarely the cord retains the position of abduction, when the voice is reduced to a whisper. If both sides are involved the cords are not usually symmetrically placed, but if both are near the median line there is serious dyspnoea; if they are not near the median line, there is aphonia. Luxation or displacement of the arytenoid, and absence of this cartilage in consequence of previous exfoliation, distort the image in a corresponding manner.

DIAGNOSIS.—The salient feature in diagnosis is to differentiate ankylosis of the crico-arytenoid joint from paralysis of the vocal cord. Usually in ankylosis there is either acute or remaining chronic tumefaction about the joint, while in paralysis there is none, unless one examines the case of paralysis at a time when the larynx is inflamed from "cold" or efforts to force the voice. In ankylosis without paralysis there is no "falling in" of the affected arytenoid, the sound arytenoid approaching it on phonation but not crossing or displacing it. In ankylosis there is nearly always a slight adductor movement; in complete recurrent paralysis there is none. A history of previous arthritis or its causes, especially typhoid fever or syphilis, is of significance. Apart from these points the diagnosis is based upon the laryngeal image and upon the exclusion of any central or peripheral cause of paralysis, such as syphilitic bulbar disease, tabes, aneurism, carcinoma of the oesophagus or other neoplasms, goitre, toxic neuritis, etc. As paralytic immobility may lead to ankylosis the two may be conjoined. The diagnosis of arthritis is further described under the title of perichondritis.

PROGNOSIS.—In acute arthritis the danger of life from dyspnoea may require a prompt tracheotomy. In typhoid-fever cases the mortality is very high. The prognosis is favorable in traumatic, rheumatic, and syphilitic cases, but there is a liability to ankylosis. Tuberculous arthritis is of grave import. True ankylosis is permanent. The outcome of "false ankylosis," or restricted mobility from adhesions external to the joint, will depend upon the feasibility of dividing the adhesions.

TREATMENT.—In rheumatic and syphilitic arthritis and in cases of doubtful origin the patient should receive the specific medication which is appropriate to the constitutional disease. Cold, in the form of ice swallowed and a Leiter coil spread over the larynx externally, is useful in the very early stage of acute arthritis. Alkaline and emollient sprays serve to clear the throat of mucus. Cocaine in two- to four-per-cent. solution is of value in causing temporary retraction of the oedematous swelling, but its powers are limited. Chronic ankylosis is not amenable to treatment unless there is stenosis of the larynx, when forcible or gradual dilatation by intubation tubes and bougies may be indicated.

W. E. Casselberry.

LARYNX, DISEASES OF: CONGENITAL MALFORMATIONS.—Congenital malformations of the larynx may be classed under four heads, namely: (1) Absence; (2) excessive development; (3) cleft; and (4) deviations of form and situation.

Complete absence of the larynx occurs in the rare cases of monsters in which the head and the thorax are wanting, and which are known as acephali, amorphi, and acardiaci. A complete absence of the larynx has also been noted in a monster described as "inclusio foetalis peritonei."

Partial absence may consist either in a general atrophy of the organ, or in the absence of one or more of the cartilages. Thus, in some instances there is a complete absence of the epiglottis; in others it is represented by a high rudimentary ridge; while in one case it is described as merely a fold of the mucous membrane. The thyroid, cricoid, and arytenoid cartilages may be absent. They

also may be rudimentarily developed, either altogether as regards one of them, or only in certain parts of each. For instance, the thyroid may lack one or both superior cornua. Again, the thyroid may be cleft, and the two plates may be connected together by a cartilaginous band. The same abnormality has been observed in the cricoid, in some instances to such an extent that the connecting band may take the place of the original cricoid, and thus cause it to resemble a tracheal cartilage. Finally, the whole larynx may be abnormally small, as seen in the male when there is congenital atrophy of the testicle, or when castration has been practised early in life. In such cases it resembles the larynx of the female or of a child.

HYPERTROPHY.—This division may be made to include the double formation of the larynx observed in the case of double monsters, namely, in the so-called thoracodidymis and also in the dihypogastricus varieties. These possess two larynges, but only one pharynx and one oesophagus. A cartilaginous plate is sometimes found interposed anteriorly between the wings of the thyroid.

Supernumerary cartilages are occasionally found on the outer corner of the cricoid cartilage. They are analogous to sesamoid bones. Supernumerary folds of the mucous membrane are sometimes seen, as, for instance, a transverse fold below the epiglottis.

The laryngeal ventricle may be abnormally wide and deep, and thus render the part more liable to eversion, to the lodgment of a foreign body, or to other accident. The anterior section of the glottic space may be more or less occluded by a web-like formation, of considerable density, and somewhat resembling an imperforate hymen.

CLEFT FORMATION.—There is no such thing, it is said, as a congenital laryngeal fistula of the neck. A case of cleft epiglottis has been reported by French.

Congenital deviations of form and situation of the larynx are rare, and occur only in connection with congenital malformations of the most marked type, such as hemicephalus, and double spina bifida of the upper portion of the spine, and in extreme lordosis of the cervical vertebrae. In these the whole larynx is depressed and moved backward to the level of the upper dorsal vertebrae. The thyroid is placed very obliquely, by which the inferior diameter of the larynx is markedly increased, while the cricoid is situated much deeper, in proportion to the thyroid, and thereby the true and the false vocal cords are abnormally lengthened. The sinus pyriformis on each side is obliterated.

Slight asymmetry of the larynx, as to position and form, is not infrequently met with.

D. Bryson Delavan.

LARYNX, DISEASES OF: ERYSIPELAS.—Erysipelas of the mucous membrane of the pharynx and larynx is, pathologically, similar to the same malady when situated on the skin. It occurs either primarily or by extension from the face along the mucous tracts of the mouth, nose, or ear. Its causes are the same as those which give rise to it when situated upon the external parts of the body, although it has been most often observed in the course of general epidemics of the disease. Of eighteen patients seen by Cornil, in whom the pharynx was affected, fifteen were under the age of thirty, and twelve were females. Upon inspection of the pharynx, the appearance of the mucous membrane, when affected with erysipelas, differs considerably according to the form of the disease which is present; the local phenomena are generally very different from those of simple inflammation, but sometimes cannot be distinguished from it.

Cornil makes three divisions of the malady, viz.: (1) Erysipelas with simple redness; (2) erysipelas with phlyctenulae; and (3) erysipelas terminating in gangrene. Erysipelas most commonly reaches the larynx from the pharynx, but the former organ may be primarily affected while the pharynx remains healthy. The disease may extend still farther down the respiratory tract, and become associated with pulmonary congestion and oedema.

In cases which come under the first division the diagnosis must remain doubtful, except when the throat lesion is accompanied by manifestations upon the skin.

Erysipelas of the head and neck is often accompanied by more or less congestion of the mucous membrane of the larynx. The symptoms are dysphagia, hoarseness or loss of voice, and pain, increased on pressure from without. Sometimes the disease is much more active, and may result in acute oedema, tending rapidly to a fatal termination. It is believed by some that the so-called primary oedema of the larynx, or phlegmonous laryngitis, corresponds clinically to a localization of erysipelas in the larynx, and that many cases reputed as primary oedema of the larynx are in reality erysipelas. The two affections seem at least to be closely allied.

As to the *prognosis*, the dictum of Hippocrates—namely, "When erysipelas extends from within outward it is a favorable symptom, but when it removes to the internal surfaces it is a deadly one"—has been confirmed by modern observation. In nine cases analyzed by Cornil, in which the face was first attacked, seven deaths occurred; whereas in nine other instances in which the eruption preceded the skin eruption, seven recoveries took place. Mackenzie saw but four cases in the whole course of his practice.

The *treatment* must be both local and constitutional. The latter should be guided by the general principles which govern the management of the disease in other parts of the body.

As to local treatment, the application of cold to the throat, by allowing cracked ice to dissolve in the mouth, should be practised as long as there is any hope of checking the inflammation. Hypodermatic injection of pilocarpine, if given early, may abort the attack, and mild alkaline sprays, with a small amount of alcohol, have an excellent effect. A solution of morphine applied in the form of spray is recommended by Mackenzie. Care must be observed lest the patient be unintentionally narcotized. Should the disease progress and tumefaction of the mucous membrane of the larynx take place, the conditions become similar to those found in acute oedema of the larynx. (*Vide* also article on *Acute Inflammation of the Larynx*.)

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Cornil, Mackenzie, Massei, Delavan.

LARYNX, DISEASES OF: FOREIGN BODIES. See *Air Passages, etc.*

LARYNX, DISEASES OF: FRACTURES AND DISLOCATIONS.—These injuries, although rare, may occur from several causes, namely, violent manual compression, falls, accidents with machines, rolling vehicles, hanging, etc. Of fifty-two cases collected by Hénocque, the thyroid alone was fractured in twenty-three, the cricoid alone in seven, both of these cartilages in seven, while in the rest the hyoid bone, larynx, and trachea were all involved in a common injury. A direct blow upon the larynx may produce a contusion of the soft parts, but can hardly result in fracture, unless the organ is supported to some extent upon the spinal column. Ossification of the cartilages will necessarily render them more liable to injury.

The *symptoms* are pain and tenderness, dyspnoea, expectoration of bloody mucus, and cough, with, sometimes, emphysema of the neighboring areolar tissue. Crepitation and, occasionally, overriding of the fractured edges may also be felt. These symptoms are sometimes so slight as to be hardly recognizable, the patient making a rapid recovery. As a rule they are severe from the first or gradually become so from the development of endolaryngeal extravasation, oedema, or the displacement of fractured parts. Any of these things may cause death by asphyxia. Later, the danger is from abscess, necrosis, and cicatricial stenosis of the larynx. The latter may necessitate the permanent wearing of a tracheal cannula.

The *prognosis* is very grave, especially in fracture of

the cricoid; and, unless the symptoms are not urgent, tracheotomy should be performed at once, or intubation of the larynx may be resorted to, with the same object in view.

Should the cartilages be much crushed, Wagner, having done tracheotomy and inserted a tampon cannula, divides the larynx in the median line, separates the thyroid, asepticizes the wound, replaces or removes the fragments of cartilage and packs the cavity of the larynx with iodoform gauze. In extreme cases, extirpation of the larynx or resection may have a future. Panas advises that in some cases the fragments be kept in place, and the patency of the laryngeal canal preserved by the introduction of a small, hollow, india-rubber plug into the larynx from the tracheal opening, and by its subsequent inflation. Leeches to the neck, and ice, both externally and internally, will sometimes prove of service.

Intralaryngeal *dislocations* of the larynx are extremely rare. They are generally of the arytenoids and due to cicatricial contraction.

Fracture of the Trachea, a rare injury, is sometimes associated with that of the larynx. As the fracture occurs in the cervical region the edges of the lesion are apt to be inverted and to cause obstruction. It is sometimes found at the bifurcation. The symptoms are dyspnoea, extravasation, and emphysema, with pain on pressure over the seat of the fracture. The prognosis is bad. The patient should be kept completely quiet and, if dyspnoea appear, tracheotomy should be performed and a cannula long enough to reach below the obstruction should be inserted.

D. Bryson Delavan.

LARYNX, DISEASES OF: GENERAL DIAGNOSIS.

At various times in the first half of the nineteenth century more or less successful attempts were made to see the larynx by means of mirrors placed in the back of the mouth. Bozzini, in 1807, by the use of a cylinder containing an inclined mirror at its further end was able to get a partial view of the larynx. But his idea was rather to demonstrate the possibility of lighting up the different cavities of the body than to study the appearance of the larynx in health or disease. Babington (1829), Liston (1840), and Avery (1844) tried various methods of illuminating the larynx. But it is to Manuel Garcia, a singing teacher of London, that the credit should be given of first practically showing in what way the larynx could be satisfactorily examined. In 1855 he published a work on "Physiological Observations on the Human Voice." These were based on examinations of the larynx, usually his own, by the use of a warmed mirror held against the uvula and soft palate, illumination being derived from the sunlight. The object of his paper and experiments was to inquire into the movements of the vocal cords and the action of the larynx in the production of the voice, and not to discover a method for clinical diagnosis in laryngeal disease. He was followed by Tuerck, of Vienna, who used similar mirrors and sunlight, but was interested in applying the method to the discovery and study of pathological changes in the larynx. Owing to the uncertainty of the sunlight in winter, he seems not to have been very enthusiastic on the subject until after the appearance of Czermak on the field in 1857. The latter, while using the throat mirrors of Tuerck, by advocating artificial light and a concave perforated mirror worn over the examiner's eyes for reflecting the light on to the small mirror held against the soft palate, succeeded in giving a great impulse to the study and knowledge of diseases of the larynx. The rival claims of the two men brought about a widespread discussion of the value of the new method, which has continued to be of the greatest service and has not been changed in any important respect in subsequent years.

The name *laryngoscope* is given to the small, plane mirror placed in the mouth, but the frontal, reflecting head mirror is such an essential aid that the two together are entitled to receive the name. In the time of Czermak round, square, oval and other variously-shaped glass mirrors, as well as those made of polished metal, were

used for examining the throat, but for many years circular mirrors have superseded all others.

For examination of the larynx a strong light is needed, and if the sun were always to be relied upon, it would be of the greatest value, for it gives a degree and kind of light which brings out the color and character of the tissues to a remarkable extent. But, as a matter of fact, we are compelled to use artificial light in most instances. Gas is generally used, and the addition of a Welsbach burner increases its brilliancy and gives it a white color favorable for inspection of the parts.

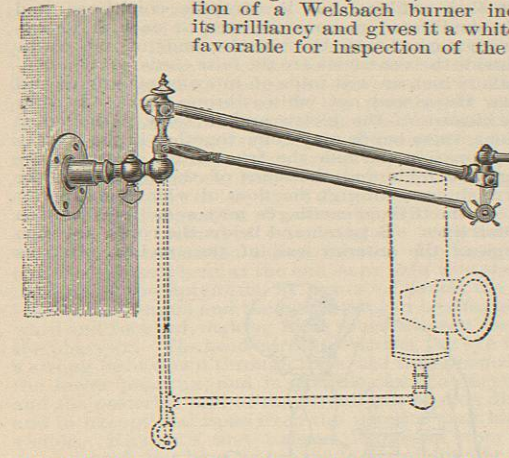


FIG. 3120.—Convenient Form of Gas Bracket for Use in Making Laryngoscopic Examinations.

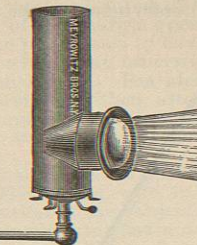
The electric light has many theoretical advantages, but it is not considered by most laryngologists the equal of gas. In the form of a small electric lamp, called a *photophore*, it is sometimes worn on the forehead. By means of a condensing lens the rays of light are concentrated and can be thrown directly upon the throat mirror, thus enabling the lamp, usually placed by the side of the patient's head, to be dispensed with. The oxyhydrogen light is used to a very limited extent.

To increase the illumination by oil, gas, etc., the rays of light are concentrated by a plano-convex lens placed in front of the flame, this lens serving to throw out toward the examiner a bundle of brilliant, parallel rays. A dark chimney holding the lens shuts off the divergent rays and makes the light coming through the lens all the more effective. It is advisable to have the part of the room where the examining lamp is, fairly dark. A bracket with a movable arm allows a proper regulation of the height and position of the light, which should be on the right side of the patient, on a level with his ear and rather less than a foot from his head (Fig. 3120).

For throwing the light into the throat, a concave reflecting mirror with a central perforation is worn over the eye and held in place by a head-band. This mirror usually has a diameter of about three and one-half inches, and a focal length of from ten to twelve inches.

For the throat, a round mirror with a diameter of about three-quarters of an inch is used. For narrow throats, or where the tonsils are large, and in young persons, smaller sizes may be necessary, and in large, well-trained throats it may be possible to use a glass as large as a silver dollar. The shank should be stiff enough not to bend when the mirror is pushed against the palate and the mirror is attached to it at an angle of 120°. The handle should be of sufficient length to be grasped firmly in the hand, and it is to be held like a pencil. Before it is put into the mouth, the glass side of the mirror should be held over the flame until all moisture is gone from its surface, otherwise it would become clouded when introduced into the mouth. The back of the mirror should always be tested on the hand, after heating, to insure its not being too hot (Fig. 3121).

When the patient is properly seated near the lamp, the examiner sits on a stool or chair opposite him and takes the previously warmed mirror in his right hand. The patient is told to tilt his head backward and protrude his



tongue, which the examiner grasps with a napkin in the left hand. The mirror is then passed, with its glass side downward and parallel with the dorsum of the tongue, until it reaches the uvula and soft palate, which it carries upward and backward until it almost or quite touches the pharynx, the shank being then carried to the commissure of the mouth. The rays of light sent from the lamp are

caught by the concave head mirror and thrown upon the throat mirror, which deflects them downward into the larynx, which is thus seen by the eye behind the perforation of the reflecting head mirror. The examiner should move his head backward or forward until the greatest intensity of illumination falls on the throat mirror. Intolerance of the mirror may occur and may be due to large tonsils, long uvula, inflammatory conditions of the fauces, irritability of the pharynx or stomach, use of alcohol, and many other causes. The use of a smaller mirror may avail when the tonsils and uvula are large; the holding of pieces of ice in the mouth where irritable conditions of the fauces exist is a decided help. The most efficacious remedy is a solution of cocaine painted on the pharynx and soft palate. In most cases, however, patience and a little manoeuvring will result in a satisfactory view of the larynx. If the tongue is short and thick, it may be impossible to pull it far enough forward to gain room enough for the mirror, in which case we can make use of the tongue depressor and pull forward the base of the tongue sufficiently to allow space for the mirror. This procedure is often of advantage also when the epiglottis bends backward.

The image seen on the mirror shows the posterior part of the larynx on the lower part of the mirror, while the base of the tongue, the epiglottis, and the anterior part

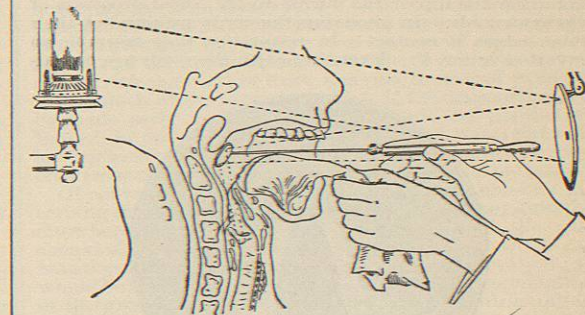


FIG. 3121.—Shows Manner of Holding Tongue and Mirror.

of the larynx are at the top of the glass. The right side of the larynx is on the side of the mirror opposite the examiner's left eye and the left side is opposite the examiner's right eye, just as in the ordinary hand glass.

The epiglottis has a yellowish-red color and varies in shape and position, sometimes being quite erect and at other times quite pendulous, forming an obstacle to a view behind it. Various hooks, forceps, and probes were formerly used to lift up the epiglottis, but they usually make matters worse. If the patient is asked to take a quick, deep inspiration and say the vowel short *e* (like *e*

in met), after a little practice the epiglottis is generally raised enough to permit a view of the cords. The direction, which is usually given, to say ah! in expiration is faulty in that it does not serve to lift up the epiglottis.

The structures in the lower part of the mirror are the aryepiglottic folds and the interarytenoid space, impor-

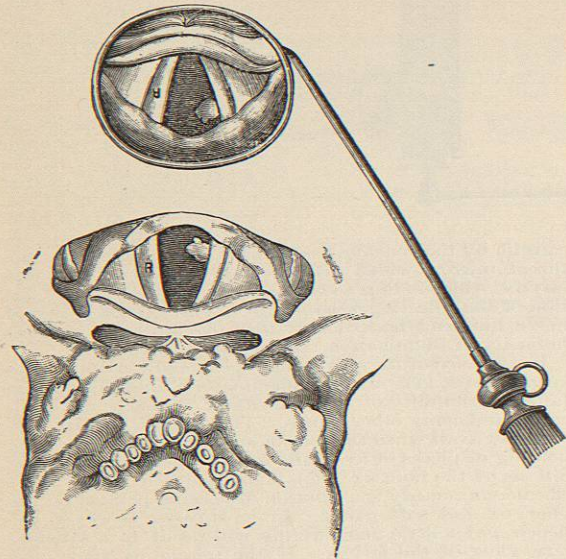


Fig. 3122.—Shows Inversion of the Parts in the Laryngoscopic Image.

tant regions on account of their being the usual seat of lesions in tuberculous laryngitis. These folds start near the median line and extend upward and outward to the sides of the epiglottis. The small rounded projections in their upper surfaces are the cartilages of Wrisberg and Santorini. The vocal cords are seen as white bands which extend from the inner angle of the thyroid cartilage near the top of the mirror to the vocal processes of the arytenoids. In phonation the cords are parallel, their inner edges in contact. In respiration they resemble an inverted letter V. Even in health the cords are not al-

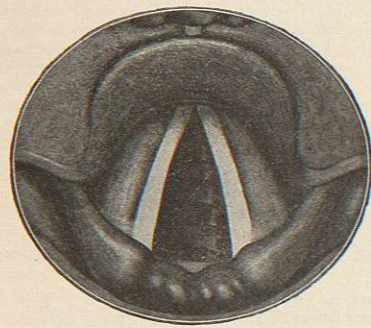


Fig. 3123.—Reflected Image of the Larynx. (Farlow.)

ways white, but are often reddish, so that a diagnosis of congestion or inflammation should not be made from the mere fact that the cords are not white. A very important point in reference to the movements of the cords is not merely whether they come together in phonation, but also whether they separate equally and to the proper ex-

tent on the two sides in respiration. Failure to recognize this has caused many cases of paralysis of the recurrent nerve to be overlooked.

Occasionally the larynx is not symmetrically placed in the neck, or it may be pushed to one side by an enlarged thyroid or other tumor, in which case the chink between the vocal cords is oblique in the mirror and not antero-posterior in the middle line of the neck. At the outer edge of the cords are the ventricles, which usually are not very evident, but in atrophic conditions and often in debilitated persons are seen as darkish depressions more marked near the anterior ends of the cords. Just outside the ventricles are the false cords, or ventricular bands, which are red folds of mucous membrane and muscular tissue and not white, fibrous cords. In very forcible closure of the glottis and in some pathological conditions, these bands may come together in the median line in phonation and hide the true cords. Between the aryepiglottic folds and the sides of the throat are the pyriform sinuses, through the floor of which the superior cornua of the thyroid cartilages may sometimes be seen as whitish lines. Between and below the cords are seen the rings of the anterior wall of the trachea, often as

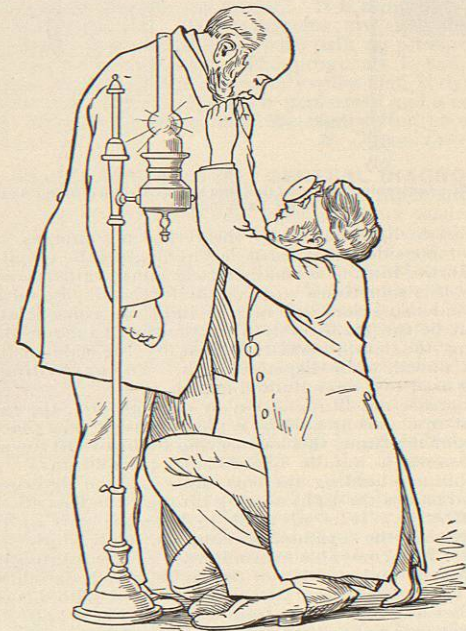


Fig. 3124.—Kilian's Method of Examining the Posterior Wall of the Larynx.

many as five or six, and, in very favorable cases, a view of the bifurcation can be made out and even a little of the left bronchus.

In the usual method of examining the larynx, as described above, the patient's head is tilted backward and the throat mirror reflects the image of the anterior tracheal wall. In order to see the posterior wall and the arytenoid region from a different point of view, we make use of what is called the Kilian method, advocated by Dr. G. Kilian, of Freiburg. The patient stands and bends his head forward, the chin pressed against the chest. The examiner kneels in front of him, grasps the tongue and presses the throat mirror directly upward against the soft palate. The dark chimney with its lens should be removed from the lamp. In favorable cases, a most satisfactory view is thus obtained of the inner and

under surface of the arytenoids and especially of the posterior wall of the trachea, possibly way down to the bifurcation. The absence of the tracheal rings makes a picture quite unlike the usual laryngeal image (Fig. 3124).

In patients wearing tracheotomy tubes a small mirror may be introduced through the opening of the tube, and the subglottic region and the under surface of the cords can then be distinctly seen.

Transillumination was advocated by Voltolini, but at the present time not much use is made of it. In a darkened room an electric lamp enclosed in a hollow tube open at the end is placed against the neck in the laryngeal region. The throat mirror is placed against the soft palate in the usual way, but no head mirror is used, the illumination coming through the skin, larynx, and tissues of the throat to the mirror in the mouth. It was expected that the light thus traversing the laryngeal structures would bring out very clearly differences in density, thickenings, neoplasms, etc., and prove of great value in deep-seated affections, but, as a matter of fact, it plays no important part in laryngeal diagnosis.

Under the designation of autotomy, Kirstein has called attention to a method of examining the larynx directly without the use of the throat mirror. He uses a stiff tongue depressor bent at the end so as to fit into the fossa in front of the epiglottis, by means of which the whole base of the tongue and the epiglottis can be dragged upward and forward, making more room between them and the pharynx. The head mirror worn over the eye throws a strong light down through the space thus opened up in the lower pharynx, and in suitable cases the arytenoids and the posterior part of the larynx can be seen directly, and in exceptional cases even the anterior part has been visible. Kirstein's first tongue depressors were rather complicated, but later he has made use of simpler forms.

Escat, of Toulouse, has devised a forked tongue depressor for use in the glosso-epiglottic fossa for dragging the tongue forward so as to permit a view behind the epiglottis. It is at times possible in children to obtain a fleeting view of the larynx by hooking the tongue forward with the finger passed down to the base of the tongue and then introducing a small throat mirror. As the base of the tongue is a sensitive region, chloroform has been used as an aid in these examinations. Ether causes such an accumulation of mucus in the throat that it is of but little assistance, unless it has been preceded by the administration of atropine.

Tobold describes the case of a lady who, without anything in her mouth, could so depress the base of her tongue that he was able to see her larynx very clearly.

The x-ray has been used principally for the discovery and location of foreign bodies in the larynx and has proved of great value in many instances.

The base of the tongue, the epiglottis, and the arytenoids can be reached by the finger, and edema, infiltration, and neoplasms can sometimes be diagnosed in this way when it is not possible to introduce a mirror.

The laryngeal probe serves to determine the mobility and consistency of structures and to test the sensibility of the lower pharynx and larynx and the condition of the superior laryngeal nerve.

John W. Farlow.

LARYNX, DISEASES OF: LARYNGECTOMY.—RESECTION OR EXTIRPATION OF THE LARYNX, WITH ARTIFICIAL SUBSTITUTES.—The history of this operation, like that of numerous other so-called modern operations, shows that it was conceived of some time before being put into actual execution; that an occasional experiment served to demonstrate gradually the possibility of its success; and that, finally, a careful experimental study of its technique led to its trial upon the human subject. In 1829 Albers made some experiments upon dogs to learn, if possible, the exact part played by the larynx in the act of respiration. He opened the trachea and part of the thyroid, and in two dogs removed the entire larynx; the first of these two died of hemorrhage, the second lived nine days and died of starvation. Albers seems to have drawn no special inferences as to the feasibility of thus

operating upon man. Von Langenbeck, in 1854, made public mention of the fact that he was prepared to make trial of extirpation upon a patient in his clinic, and he even gave a general description of what he intended to do, but the patient declined operative help. Foulis states that in 1856 Köberle spoke of the propriety of partial and total operations of this nature; and that in 1866 Watson, of Edinburgh, operated upon and lost a patient. The same plan seems to have suggested itself to Hueter, in 1870, who saw an otherwise healthy patient die of cancer of the larynx. His idea was to make a preliminary tracheotomy, and then, after extirpating the growth, to sew the mucous membrane of the pharynx to the skin, in order to make a permanent fistula for purposes of feeding.

But the greatest credit should be ascribed to Czerny, now of Heidelberg, who, in 1870, undertook a systematic investigation of the subject. He was the first completely to demonstrate that not only was it possible to remove the entire larynx from dogs, but that the operation was practicable on man; and he even laid down rules for its performance. He, moreover, showed that when a T-shaped tube was introduced properly, a certain capability of speech might be expected. Such tubes he constructed for some of his dogs, and these tubes were the rude and simple precursors of the elegant models of today.

Three years later, Billroth found opportunity, in his Vienna clinic, to make the first attempt upon a living patient. This patient had already undergone a laryngotomy for cancer, which had returned in four weeks and involved all the interior of the larynx. The operation was a brilliant success, and the patient in due time was supplied with an artificial substitute by Gussenbauer, who has displayed conspicuous ingenuity in his mechanical devices for this purpose. The fact that the patient died a year later from cancer of the cervical glands in no wise detracts from the success of the operation as such. The practicability of this extreme measure having received this brilliant demonstration, other surgeons were not slow to resort to it; and Billroth was quickly followed by Heine, Mass, Schmidt, Schönborn, and numerous others.

INDICATIONS.—The principal indication for this extremely radical operation is obviously the presence of a malignant tumor which cannot be thoroughly removed by other methods, or which, after previous milder operative attacks, shows a disposition to return. The larynx, however, has been removed for other causes besides the presence of such tumors; it has been removed on account of destruction of its identity from cicatricial stenosis, for lupus, and for intractable perichondritis followed by necrosis; and one may, at least, imagine a case of primary tuberculosis of the larynx in which, if the diagnosis could be made early enough, resection would be justifiable. Indeed, in one case a tuberculous larynx was removed, having been considered to be cancerous; the patient recovered from the operation to die months later of phthisis.

Of course those general principles which obtain concerning the earliest possible removal of malignant growths elsewhere apply with equal force here, and the rule should always be, "the earlier the better." Extreme exhaustion would, in all cases, be a contraindication; so would be the hemorrhagic diathesis and the dissemination of the growth beyond the laryngeal confines, although in several cases more than the larynx has been removed. Thus Langenbeck, in one case, did not hesitate to remove along with it a number of enlarged submaxillary glands, the hyoid bone, and base of the tongue, along with a part of the pharynx and of the œsophagus; he was compelled to tie both external carotids, as well as both linguals, external maxillaries, and superior thyroids. The patient made an excellent recovery, but died some months later from a return of the disease.

Indeed, one may say that the proportionate gravity of this always grave operation depends in largest measure upon the general condition of the patient. Nevertheless, its results have been so conspicuously successful in other-