Sarygoal Phtthisis

Thesis

offered by
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[Handwritten notes and signatures]
Laryngeal Phthisis.

by

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29th April 1849.
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Preface.

Since taking my degree in August 1876 as Bachelor of Medicine, I have devoted a large share of my attention to the study of diseases of the Throat & Ear, and have for nearly a year held the office of Registrar & Pathologist at a Hospital especially devoted to those affections. Being permitted by the staff to make use of the valuable material the institution afforded, all collected as part of my own duties, I may lay claim to unusual facilities for the study of the subject chosen for my essay.

I have to thank Mr. Lennox Browne for the privilege of reproducing some most characteristic drawings, made by him from Cases & Specimens which have during this period come under my own observation.

523, Commercial Road.
London, E.
29th April 1879.
Laryngeal Phthisis.

The occurrence of laryngeal disease in coincidence with consumption (tuberculosis) in a certain number of cases has been clinically observed at least as early as the first century of the Christian Era, when Celsus noted "tussis destillatio raucitas" and in some cases "tabes" among the effects of exposure to cold.

That this is not merely an incidental complication, but one essentially connected with the pulmonary disease, which is the most unmistakable evidence of, and most fatal element in phthisis, is becoming more apparent as each new investigator puts the results of his enquiries on record. Hence has arisen the name Laryngeal Phthisis.

The term Phthisis, a wasting of the organism from disease of any of the organs
organs, was soon limited to the wasting fear excellence which was found to accompany a certain pulmonary affection consisting in the consolidation of the lung tissue, followed by a softening and breaking down of the same.

Next, it was used to denominate the lung disease itself which brought about the wasting or decline.

Laennec in 1826 advanced the view that all cases of pulmonary phthisis were due to a specific non-inflammatory growth, which underwent a caseous degeneration, tending to progressive extension, and thereby leading to the characteristic destruction of lung tissue.

Louis gave a fresh impulse to this opinion by publishing the results of his numerous autopsies on the bodies of persons dying of pulmonary phthisis, and describing the appearances
pleasances as being almost without exception those of grey granulations, yellow tubercle (tubercle proper) and an intermediate form consisting of grey granulations with a yellow centre.

More recently it was found that grey miliary tubercles were not the only source of caseous material, and with the march of microscopical investigation, the term tubercle was limited (as by Virchow) to the grey miliary form, instead of the yellow cheesy form to which the name was originally applied.

Caseation is the result of the retrograde metamorphosis of any non-vascular tissue composed of closely crowded cellular elements, such as are found in the minute nodular lesions of general tuberculosis in the various organs of the body, or in the excudations and proliferations in and around
around the air-cells in pneumonia processes, as occurring in persons of feeble vitality or so-called scrofulous diathesis.

Tubercle was then looked upon as a new growth consisting of a reticulated meshwork filled with closely-packed lymphoid cells (essentially like lymphatic glandular structure), but having the network in part made up by the branching processes of certain very large multinucleated cells, called "giant-cells"; these processes being continuous with the reticulations of the network. This in due time, under the unhealthy constitutional influences which lead to its development or deposition, tends to breakdown centrifugally into a mass of granular fatty debris, indistinguishable from the results of the same change in the products of catalethal croupous.
croupous, or interstitial pneumonia in the air-cells of tuberculous subjects.

From this point of view, phthisis would consist only exceptionally in the deposition + disintegration of true tubercular deposits, and such is the opinion put forward by Riesner, who considers true tubercular phthisis to exist as part of a more or less general infective process.

This revolution in opinion is evidently brought about by the results of histological research on those appearances which the naked-eye could not distinguish from tubercle.

Now there is a tendency for the microscope, instead of thus limiting our a specific tubercle, to look upon the so-called tubercle, by a process of generalisation, as merely an inflammatory change, owing its peculiar form to the nature of the organ, and its minute structure.
Structure to the constitutional condition of the individual affected.

The constitutional taint of scrofula is now considered, from a clinical point of view, to be present in all cases of tubercular disease, and this is borne out by the following histo-pathological observations.

In scrofulous people, the cellular products of inflammation have a peculiar proneness to infiltrate the neighbouring tissues, and a peculiar tendency to slowness of absorption, which is accounted for by their being for the most part larger than those ones with in healthy inflammations and consequently less easily removed by the lymphatics.

The rapid changes in these deposits are to be accounted for by the absence of vascularity, whereby necrosis takes place instead of reparative inflammation.

This now vascularity is due to the blocking of the blood vessels by the proliferation...
proliferation of the connective tissue elements and also to the original disproportion between the volume of blood in the system and the weight of the body. The "giant cells" Rundfleisch to look upon as enlarged endothelial or connective tissue cells.

Tuberculous disease has been sufficiently shown by Klein and Burdon-Sanderson to have its seat in the adenoid tissues. Such tissue we find in the follicles of lymphatic glands, the Malpighian corpuscles of the spleen, also in Peyer's glands and the solitary glands of the intestine, the follicles of the pharynx and tonsils, the thymus glands of the trachoma glands of the conjunctiva. Recently it has been found to exist in many other situations, as around the blood vessels of the pia mater and of other parts, in the neighbourhood of the smaller bronchi, in the pleura immediately beneath its endothelium.
in the mucous membrane of the alimentary canal and in the medulla of bone.

Phthisis may then be looked upon as a consolidation + subsequent destruction of lung, the result of tubercular or inflammatory (cataarrhal, croupous, or interstitial) affection of the lung (so-called syphilitic phthisis being left out of the question) in a scrophulous individual.

By *laryngeal phthisis* we understand a definite destructive form of laryngitis accompanying pulmonary phthisis (in the acceptance above mentioned). According to Ziemssen, it includes "only those ulcerations of the larynx following pulmonary consumption, and which are caused by miliary tuberculosis and by tuberculous (scrophulous) inflammation."

Sambert defines it as a "laryngitis associated with the scrophulous diathesis."

Tuch* very cautiously describes it under the heading "laryngeal diseases accompanying pulmonary tuberculosis."
As to the connexion between phthisis laryngea and phthisis pulmonalis, the advances made in the investigation of this question both clinically and pathologically are among the most striking which modern means of investigation have brought about in the whole range of medicine.

In the pre-laryngoscopic times, beyond the symptoms the only other evidences of the existence of the laryngeal disease were the post-mortem appearances. Now the impossibility of obtaining such examinations after death in many cases, and the disappearance of the signs of the earlier and most characteristic stages of the disease through collapse of the parts after death when examination was possible, left the whole subject in a shroud of obscurity.

Since however the disease has been examined more frequently as the laryngoscope permits during life, there has been no lack of admirable and uniform clinical memoirs on the subject, along with a host of strangely different pathological researches.
researches into the nature of the lesion or lesions in the various parts or tissues of the larynx. The paucity of microscopical investigations on larynges of people dying with (not to say of) this disease is no doubt the cause of this diversity of opinion; a result no doubt due as well to the different interpretations of terms and appearances employed by different writers.

The general disregard of laryngoscopic investigations in our Consumption Hospitals, the fact that patients apply separately at Throat and Lungs Disease Hospitals for the relief of their laryngeal and pulmonary symptoms respectively has no doubt been one great cause for the frequency of laryngeal complications in phthisis not being recognised.

Laennec's teaching was to the effect that laryngeal phthisis was purely a tubercular affection, having observed it so frequently in connection with pulmonary consumption (which he believed to de
depend solely on the presence of a specific tubercular new growth) that he could not conceive it being otherwise than identical in nature with that disease.

Louis found it present in 20% of his cases of consumption of the lungs.

Most recent writers make the percentage still higher. Potter out of 200 cases of phthisis found the larynx more or less affected in about 57% and to the extent of ulceration in about 27%. The latter and most detailed statistics are those of Heinze, published during the present year, stating the point as follows. In the Pathological Institute of Leipzig there were examined between April 1st, 1879, and December 31st, 1876, the bodies of patients dying of various diseases, all 4,486.

Pulmonary phthisis was the cause of death in 1,226 = 27.3% of all deaths.

Of these laryngeal ulceration was present in 376 = 30.6% of the cases, and tracheal ulceration was present in 99 = 8.0% of the cases.

Again, he solves the question as to the occurrence of laryngeal ulceration apart from...
from phthisis. Out of the same 1,486 bodies omitting syphilis, diphtheria, laryngeal ulceration was present in 38.7% of these three died of pulmonary phthisis; 36.7% or 94.7% of the cases of laryngeal ulceration. And three died of other diseases 0.1% or 5.2% of the cases of laryngeal ulceration.

These calculations, showing the remarkable frequency of ulceration of the larynx in pulmonary phthisis, and its remarkable rarity apart from it, seem to leave as indisputable the fact of the essential connection between the two diseases — nay, almost to establish the identity of their nature.

From an anatomical point of view the identity of the disease in the two regions is still further supported.

Heitler describes the presence of adenoid tissue in great abundance in the mucous membrane of the larynx in the following places: the ary-epiglottic folds where the squamous epithelium passes into the cylindrical i.e. where the pharyngeal mucous membrane turns over into the cavity of the larynx; the mucous membrane covering...
covering the arytenoids, especially the uppermost part; and over the cartilages of Santorini & Hirschberg; between the arytenoids opposite the angle of the thyroid cartilage; in the anterior part of the ventricles of Morgagni, especially in the upper part of the sacculus. Lately too, lymph-follicles such as exist in the above parts of the larynx have been demonstrated on the laryngeal surface of the epiglottis.

It will be seen therefore that the larynx is a most suitable milieu for the development of tubercle, and it will be seen later on that those parts which have been shown to be the favourite seats of the adenoid tissue are those in which the ravages of laryngeal phthisis are most marked.

Such being the case, a disease like scrofula characterized by its tendency to invade lymphoid structures has an opportunity for developing itself in the larynx not less favourable than it has in the lungs.

Again the functional continuity of the larynx
the larynx with the lungs exposure it along with them to those causes which are known to excite phthisis in acrophilous subjects, such as catarrh from exposure to cold or other irritant, excessive functional activity &c. &c.

The pathological continuity of the parts has been proved by the frequent observation of ulcers extending from pulmonary cavities directly through the trachea to the larynx.

On statistical, anatomical, physiological & etiological grounds we would expect to find the laryngeal disease identical with that in the lungs, it remains to be seen whether this a priori view is quite borne out by the microscopical appearances.
Laryngeal Phthisis

Clinical History
The history of a case of laryngeal phthisis includes in reality the course of the general and pulmonary disease, as well as that of the laryngeal disease. We are only concerned at present with the last of these, except in so far as we are necessitated to refer to the relationship between them.

The General Course of the disease is to a great extent parallel with that of a pulmonary phthisis. The commemorative history is much the same, as regards hereditary predisposition, origin in a neglected cold, dyspnoea with diathesis to fat food, cough, perhaps haemoptysis, loss of flesh, night sweat, lassitude and especially steady decrease in weight. On examination, we find the usual signs of the tubercular diathesis. The pale face, flushing readily, large bright eyes, long lashes, a red line along the otherwise pale gums, long incurved nails.
nails (filiform-shaped) are among the physiognomical details we have to notice.

A disproportion between the weight and height according to Hutchinson’s Tables, and a deficiency in the vital capacity as determined by the spirometer (after a little practice has been gained, in fact, in particular cases, so that a reliable estimate may be made of the amount of tidal reserve air) are also important features.

“Then the clothing is removed one is struck with the leanness of the chest, the hollowness of the sub-clavicular depression and of the supra- and infra- spinatous fossae, the prominence of the scapulae, the small antero-posterior diameter of the thorax, the width of the intercostal spaces, and the abdominal character of the respiratory movements. The upper part of the chest on both sides, or on one side particularly, move but slightly, when the patient voluntarily takes deep breaths. The number of respirations is somewhat increased, the action of the heart irritable, and the pulse accelerated. The temperature
This must be due to a primary deposition in the lungs, unless we believe that the eye can detect
lung changes before the ear can appreciate any departure from normal in the sounds of the
chest. In such instances however, we cannot contro-
vert the fact that in taking the history of cases of
where there is advanced pulmonary disease, one
is struck by the frequency with which patients
ascribe their first trouble to a laryngeal cause,
such as a loss of voice or a difficulty in swal-
lowing, cough, or hemoptysis having occurred
after a considerable interval.
temperature in the morning is normal or subnormal, but during the afternoon or evening it rises a little (100.4 in the axilla) the cheeks become flushed and the hands hot. Such are the general signs of incipient consumption whether of lungs or larynx.

With regard to the condition of the chest, as we observed before, Laryngeal Phtisis may come on in any stage of consumption. In a large proportion of those who apply at Throat Hospitals with laryngeal phtisis the lungs offer no perceptible sign of disease. It is however certain that the laryngeal appearances now recognised as phtisisical in no case run their full course without the supervision of consolidation and breaking down of the lungs. The constitutional changes are exactly those of ordinary phtisisis, so we shall now dismiss them, and consider the local signs and symptoms which alone are within the scope of this paper.
The course of Laryngeal Phthisis has for convenience of description been divided into various stages. Isambert has adopted the following division:

1° Période - Catarrhal ou épithélial
2° Période - Ulcerative et adénatomateuse
3° Période - Suppurative et mécosique.

These stages correspond pretty well to the three stages of pulmonary phthisis from a morbid-anatomical point of view but chronologically they have no analogy whatever.

With greater advantage the second stage of Isambert may be broken up into that of tumefaction and that of ulceration, if only for the purpose of bringing out the important point that in laryngeal phthisis the ulceration is preceded by a well-marked degree of swelling. We shall for convenience therefore employ the somewhat arbitrary division of the course of the disease into the four stages:

1° Stage — Anæmia
2° Stage — Tumefaction
2nd Stage—Inflammation.
3rd "— Ulceration.
4th "— Perichondritis and Necrosis.

Stage 1. Anaemia. The symptoms present in this stage are changes in the voice and the occurrence of cough. The voice becomes feeble and very easily fatigued and not unfrequently changes in character during a quite short conversation from a gruff hoarseness to a high falsetto, which as quickly passes into a toneless whisper. These changes are probably influenced by lodgement and dislodgement of secretion, and also by nerve irritation (superciliary). In many cases recurrent attacks of so-called functional or hysterical aphonia may take place during this stage as we have often elicited from patients whom we have examined in the later and most unmistakable stages of the disease. A constant aphonia may be present due probably to the fatty or tubercular changes.
change in the muscles as described in the previous section or to the general debility of the whole muscular system.

A unilateral paralysis of the muscles supplied by the right inferior laryngeal has been known to be occasioned by the involvement of that nerve in a pleuritic thickening at the apex of the lung. Gerhardts considers this to occur in one-twelfth of the cases of phthisis of the apex, but according to Remsen, this estimate is somewhat too high.

The cough is of an irritable character as if due to the presence of a foreign body, compared to the feeling which would be caused by a fly in the throat. Unless due to pulmonary complications it may be quite dry.

Laryngoscopic Appearance. The entire mucous membrane presents an abnormal degree of pallor. "It is something more than an anaemia, for while all parts of the larynx, naturally pale, will assume
assume a muddy and greyish hue, the vocal cords will often be congested, and many engorged capillary vessels will be seen ramifying on that portion of the mucous membrane considered anaemic. The palatal mucous membrane usually displays this condition of general pallor with numerous engorged vessels ramifying at its edges.

In some cases the occurrence of frequent or constant attacks of catarhal laryngitis imprints on the mucous membrane the appearances peculiar to that disease, so that we may have a condition of chronic hyperaemia.

Again, there may be patches of hyperaemia on an otherwise pale membrane.

The adduction of one or both vocal cords during phonation is at times to be seen impaired or absent.

2nd Stage... Infection

The symptoms of the previous stage are now apt to be increased. Cough is present
is present in a more severe degree, owing to the following circumstances. The mucous membrane in the interarytenoid space is naturally thrown into folds during the closure of the glottis. When it becomes thickened the pressure to which these folds are exposed is of course much greater, hence a chronic irritation is kept up in a part localised by Storch of Vienna as one of those spots to which the irritating material has to touch before rough is produced.

The lump formation around the arytenoid cartilages tends to hamper the movements of these bodies and thus to interfere with phonation and respiration. The latter, indeed, may in rare cases amount to suffocative dyspnoea from a mechanical stenosis produced by the mere swelling of the tissues.

In addition, a prominent symptom as this stage goes on is a difficulty of swallowing. This so far is usually confined
Fig. 1

Thickening of epiglottis and arytenoid cartilages in a male patient the suspect of laryngeal phthisis who had suffered pain in swallowing for eight months, pain in the chest, cough, and hoarseness for four months. Disease at left apex.

from Samuel Brown.
The Throat and its Diseases 1848.
p. 336, fig. 144.
confined to fluids, so that a patient may swallow solid food or thickened fluids, but owing to the impediment to the mobility of the epiglottis and arytenoid cartilages, the larynx does not close and drops of the fluid effect an entrance causing intense fits of coughing, especially if the fluid be slowly sipped instead of being rapidly gulped. More rarely the swelling round the arytenoids offers an obstruction to the passage of solids down the pharynx so indeed as to simulate a stenosis of the oesophagus.

**Laryngoscopic Appearances.** The laryngoscope reveals to us appearances exactly corresponding to those later to be described as seen in the post-mortem preparation.

The epiglottis undergoes an amount of swelling such as to render it almost unrecognizable. Its sharp edges become rounded off, its normal curvature obliterated.
Fig. 2.

Varyy growth & congestion of vocal cords from a girl aged 21.
A slender & tall woman with loss of voice several recurrence of
hamorrhages, night sweats, loss of weight, amenorrhea,
pectoral & tendency to phthisis. No wheeze breathing at
both apices posteriorly. She improved considerably
under Hypophosphit of soda & cod-liver oil, es-
pecially after obtaining a situation with less ex-
posure than in her previous one.
obliterated and replaced by a simple transverse arching, the concavity of which is directed backwards. In extreme cases it then appears as a tubular or sausage-like body of a pale, but sometimes brownish red colour, its outer extremities bending somewhat backwards.

The ary-epiglottic folds are usually the first parts to show changes sufficient to warrant a diagnosis of laryngeal syphilis. The interarytenoid space becomes filled up by the infiltration, and offers to view a cushion-like elevation with a velvety surface, usually covered with mucus. This elevation is by no means peculiar to syphilis. In some cases a wart-like growth covered with mucus may be seen in this position as in the accompanying drawing, Fig. 2 if a case of the mucous membrane present under our care. A typical condition however is that of the mucous membrane.
Membrane covering the capitula of the larynx. The folds containing the cartilages of Santorini and Weisberg swell on one or both sides (usually both) till they obliterate the prominence of these cartilages and form round papilliform swellings whose wide ends reach the middle line posteriory and whose narrow ends merge into the swellings of the ary-epiglottic ligaments. The latter at first appear continuous with the lateral extremities of the epiglottis, but are later quite concealed by the overhanging swelling of that part.

The ventriculus bandis having in the tumefaction become continuous with the ary-epiglottic folds and by their swelling diminish the apertures of the ventricles, sometimes to a mere slit while at the same time they conceal more than the normal amount of the true cords.

The vocal cords by this time are usually ulcerated, and as a rule are only
only visible in the earlier portion of the period of tumefaction being concealed by
the above described condition. When
seen they are observed to have lost their
sharpness of outline, and to have ac-
quired a swollen appearance, and to
present on their surface small linear
erosions of a white colour (where the
fibrous tissue is exposed) or frequently
ersorations on their margins and small
ulcerated points at the tips of the
vocal processes.

3rd Stage — Ulceration.

While the symptoms of the previous stages
continue to increase in severity, we have to
note in this stage a more marked degree
of aphonia owing to the more or less extensive
destruction of the vibrating edges of the vocal
cords. (though by the vicarious action of the ven-
tricular bands relaxed by the laryngeal
sphincter muscles & tensed by the crico-
thyroid a croaking kind of voice is
produced), and especially a more
pain
pain during attempts to swallow solids. This latter symptom is the one which gives the patient the greatest distress by preventing the ingestion of sufficient nutriments. The cough is now accompanied by a considerable amount of purulent (sometimes sanguinolent) expectoration from the larynx, irrespective of that from the lungs. This secretion accumulating around the orifice produces rattling and blowing sounds which simulate during auscultation of the chest the sounds indicative of the presence of cavities. To avoid the source of error, it is advisable to make the patient clear his throat, then to listen over the larynx and note the sounds produced in it and in the nearest place to pass the stethoscope gradually down over the trachea observing how the laryngeal sounds become less loud while the pulmonary sounds come within hearing. In addition the discordance of the sounds...
To obviate this difficulty, Dr. Stone of St. Thomas' Hospital has made use of a small reed trumpet the sound of which, when blown by the patient, may be appreciated during auscultation similarly to the vocal sounds under ordinary circumstances.
the sounds with the results of percussion must be noted. Vocal resonance is frequently not to be elicited, owing to aphonia. From the description we further on of the position and appearance of the ulcers after death, it is evident that many of them are quite invisible to the laryngoscopist, others only detectable by the appearance of a line of elevations or fungosities such as would be presented by the side-view of the raised edges of the ulcers; again others which are visible but from the position of their plane in relation to that of the mirror very much foreshortened, lastly however a number lying in a plane parallel or nearly so to that of the mirror, as for instance on the summit of the arytenoid cartilages and on the upper part of the laryngeal surface of the epiglottis, on the ary-epiglottic ligaments and the false and true cords. This will be illustrated by comparing the laryngoscopic picture.
Fig. 3.

Laryngoscopic appearance of case under my obstetrical treatment, the post-mortem appearance and description of which is given at p. 449.

After Drawing from Nature by Mr. Lennox Brown.

Fig. 4.

Characteristic ulcercation of larynx, especially of epiglottis.

From Lennox Brown op. cit. p. 350. fig. 3.
picture fig 3. with the post-mortem appearance of the same case fig 7.

The phthisical ulcers usually start on the posterior surface of the epiglottis or over the arytenoid cartilages (after the vocal cords). On the former they extend to the margins of the epiglottis and along the ary-epiglottic ligaments; on the latter they extend laterally, so that the upper aperture of the larynx may be surrounded by a ring of ulcers and fungiosities. The shape of the ulcers may be quite irregular and from the shortening often indefinable, or it may be oval as in the shallower ulcers of the epiglottis, or it may be of the shape of a cluster of grapes, often of a worm-eaten or carious appearance from the confluence of follicular ulcers. The floor is granular, bared with pus and of a greyish colour. The edges are usually raised or tuberculated bounded by a thin red line, but with no considerable areola of redness, the surrounding parts being
being of an anaemic appearance and presenting the characters of the tumefaction peculiar to the serpiginous infiltration. On the false vocal cords a similar process takes place.

The true cords are as we have seen early eroded and their edges eaten away. The ulceration may reach the attached margin and leave a wide gap between the anterior and posterior segments. They may even be completely removed, leaving the function of phonation to be vicariously performed by the ventricular bands which may be seen to meet in the middle line.

4th Stage. Perichondritis + Necrosis.

The extension of the inflammatory process to the perichondrium and cartilages involves with it an aggravation of all the patient’s previous sufferings. The voice becomes weaker and from implication of the joints, independently of other causes, an immobility of the cartilages may
may render it aphonic while at the same time its exercise becomes acutely painful.
Respiration is more and more embarrassed and the swellings may cause such a degree of atonia as to threaten life. A fever of the breast from the decomposition of the necrosed parts is not infrequently observed. The cough continues distressing; frequently accompanied by haemorrhage, always by quantities of purulent expectoration, in some cases by the expulsion of portions or even the whole of an arytenoid or other cartilage.
Dysphagia is now the symptom which above all causes the most acute agony. Neither their fluids nor solids are within the power of the unhappy patient to swallow, and death from inanition is imminent.

With regard to the temperature of the food, hot things per se increase the pain, and things such as ice tend to relieve it. An almost diagnostic symptom is pain on pressure being exercised externally over
Figs. II + VI

Fig. V. Laryngoscopic appearance on admission Sept. 16, 1878 of a female mother at 36 with pulmonary phthisis, cough, hoarseness, pain in swallowing, loss of appetite.

Fig. VI. Appearance on Oct. 23, 1878, with postruminal appearance. Fig. X.
over the arytenoid, as by the finger and thumb seizing the larynx deeply behind the thyroid cartilage.

The laryngoscope reveals the continuance and extension of ulceration. In addition a swelling is seen corresponding to the seat of the perichondritis. Most usually it is the arytenoid cartilage and then the swelling may bulge forwards beneath the vocal cord or upwards and backwards, (see also previous figures) excluding the aperture of the larynx as to embarrass inspection by the laryngoscope while threatening life by hindering respiration.

The swelling has usually the shiny reflex of oedema, but when the pus is threatening to come to the surface it acquires a blunter hinge and an appearance suggestive of boggy swelling.

From obstruction to the movements of the cartilages the vocal cord of the side affected is sluggish, then limited in the extent of its movement, then quite immobile.
When the cartilage is extracted, as above-described, there is seen a depression and collapse of the parts where formerly the swelling was detectable, this however is not present in those cases in which the sclerosis around the cartilage is so considerable as to cause the soft parts to retain their shape.
Laryngeal Phthisis.

Pathology.
We shall now describe the morbid appearances as they are found in the four stages into which we have divided the course of the disease.

1st Stage —— Anaemia.

Anaemia of the laryngeal mucous membrane manifests itself post mortem on the body by a general pallor of surface, but with the subsidence of the blood into the depending parts of the body when life passes away, the pallor of the larynx is not so striking as it was during life when contracted with the parts of a patient not otherwise anaemic. It is therefore more essentially a laryngoscopic than a macroscopic phenomenon.

2nd Stage —— Tumefaction.

Tumefaction is the most important feature in the diagnosis of this disease and both its stained and microscopic appearances call for careful consideration.
Thymus appears as a smooth, tense swelling of a greyish-white or greyish-yellow tinge, which most unfrequently presents on its surface a slightly granular, cheesy-like deposit of a yellow colour, sometimes in isolated spots, sometimes in confluent patches. Occasionally in the submucous layer there are numerous hemorrhages which give the whole swelling a reddish brown tinge.

The changes in the configuration of the various parts affected are very characteristic.

The epiglottis loses its leaf-like form, the borders instead of being sharp become rounded, the normal curvature of the part in an upward, outward, and forward direction is lost, and gives place to a backward and inward curvature of the base, its thickness is increased to from 3 to 6 times the normal extent and it assumes a sausage or turban-like form lying across the anterior part of the larynx. Isambert has dubbed it somewhat fancifully the "epiglottis in phimosis."
The mucous membrane over the arytenoid cartilages especially in the upper part where it encloses the cartilages of Santorini & Hisberg is early tumefied and gives on either side of the larynx (usually on both) the appearance of a large pyriform tumour in which the outlines of the cartilages are lost, the thickest parts of the pears being over these cartilages tapering off outwards & forwards into the ary-epiglottic ligaments.

These ligaments, sometimes quite lost in the swelling of the aryepiglottic folds may give the appearance of the sides of the epiglottis arising directly from the arytenoids. In extreme cases the tumefaction of the epiglottis & arytenoids is so tense and the supra-glottis so concealed that the French author above mentioned has not inaptly compared the appearance to that of a paraphimosis.

The inter-arytenoidal space is filled out & obliterated so that pyriform bodies are
are in close contact with each other at their bases.

Very distinctive changes take place in the ventricular bands—ventricles.

The ventricular bands lose their thin form, the angle which they form with the side wall of the vestibulum becomes almost obliterated. The free borders of the bands lose their elliptical curvature and run straight from before backwards, thereby consequent ly concealing more of the true vocal cords than normal; in fact may swell so much inwards as to cover the latter completely.

One result of the increase in volume of the bands is the diminution of the size of the ventricles in depth and in the height & breadth of their apertures. In moderate cases the height of the opening is diminished, but it retains its normal shape; in severer cases the opening becomes triangular, slit like or may be closed up altogether. Frequently the vestibule of the ventricle becomes closed up.
up and the sacculus is thus quite separated from the laryngeal cavity.

The vocal cords do not so frequently present this form of tumefaction such as we see it in the epiglottis and aryepiglottic folds, but in severe cases the volume of the cords is increased, the phona
tonic form is lost and the contour becomes more oval in form.

Below the glottis, the membranous part of the trachea is the only part subject to this swelling.

The reason of the exemption of the vocal cords and cartilaginous trachea from this morbid appearance seems to be the tightly stretched condi
tion of the mucous membrane over these parts.

This swelling is certainly in part due to inflammatory oedema, as is shown by the fact that after death it is less tense and that the mucous membrane is more loose and crumpled owing to
to the disappearance of fluid. On the other hand the persistence of the greater part of the swelling after death and the effect of scarification during life, to produce severe ulceration and shot relief of tension, proved that the infiltration is of a specific character.

Lambert found on section of the epiglottis in cases of tubercular lumenaction transparent infiltration like a compact jelly which had no tendency to escape by the incisions made in the enveloping membrane even when a considerable degree of pressure was exercised. This fact, which explained the inutility of any scarifications practised with a view to treatment led to the opinion that this was something else than an oedema and that it might well be a protoplasm, an early form of laryngeal tuberculosis. On microscopical examination it was found to contain in addition to a certain number of inflammation corpuscles (corpuscules d'inflammation)
d'inflammation) a number, variable in different cases, of transparent tubercular granulations (granulations tubercules transparentes).

The typical mature granulation was not met with throughout, but were without doubt those primary elements, consisting in some instances of nodules without central degeneration, in others of agglomerations of small cells without any nodular appearance, but whose real nature was demonstrated by the caseous degeneration which was the termination of these morbid processes.

Such being the matted eye appearance of the phthisical or oesophagal infiltration, we must now look at its minute structure.

Küenzi's description which agrees with that of Isambert is more minute expressed.

In the first place there is been a great increase in the thickness of the
the mucous membrane, affecting alike the mucous and submucous layers and reaching as much as 3 or 4 times the normal extent. This is most marked over the arytenoid cartilages, especially at their apices and over the ary-epiglottic ligaments and the epiglottis.

The epithelium prior to the ulcerative stage is quite normal, even though immediately beneath it there be a dense deposition of tubercle. With fig VIII.

This deposition of tubercle takes place in the mucous and sub-mucous layers, but superficial to that within the glands are found. In many cases of tuberculous infiltration the chief change consists in a collection of numerous tubercles some very small, others attaining the size of a half-coined and visible to the naked eye. These tubercles are imbedded in a zone of large-meshed reticulated tissue filled with numbers of small round cells.
As a rule the tubercles occupy a stratum immediately under the epithelium, but occasionally they are evenly diffused throughout the whole thickness of the mucous membrane. At times also there is a deeper layer of the deposit, separated from the above by a zone containing neither tubercles nor reticulated tissue, but a few round cells and a rich supply of capillaries.

In the deeper layers of the mucous membrane the tubercles and the round cells diminish greatly in amount.

The tubercles referred to are at times round, at times oval and long and of the most varying size and shape. Henze has found them as large as 2 millim. in diameter. They are sometimes fresh, at other times their centres present the commencement of fatty degeneration or caseation. In advanced cases there is seen considerable caseation of the parts surrounding the tubercle. The older tubercles are
are found mostly in the central part of the mucous membrane, the flesh ones towards the margins. In the majority of cases there are giant cells to the number of from 1 to 3—rarely more—sometimes in the middle, sometimes towards the margin of the tubercle, and sometimes even in tubercles which were in the rest of their substance quite casious.

Other authors Andral, Colberg, Rindfleisch, have dwelt upon the all-importance of the changes in the mucous glands as constituting the essence of the disease.

Wagner observed as a peculiarity of lymphadenoma of the air passages, that the numerous large glands in respect of their ducts and their acini were often quite healthy or only very slightly affected while the mucous and submucous coats were thoroughly attacked.

Steinze has found the glands in no case quite unchanged and in high degrees
degrees of tubercular infiltration they have undergone very considerable changes. He considers them to be affected primarily as well as secondarily (by extension). The primary affection consists in an interacinous and an intra-acinous infiltration of round cells. While the latter infiltration causes the destruction of the gland cells, the interacinous presses upon the membrana propria which yields before it so that the gland quite loses its normal form. The capsule of the gland may at times be seen containing the remains of only a very small part of its original number of acini lying in a small-celled infiltration, and in further advanced stages itself may be destroyed leaving the original position of the gland to be recognized only by the presence of isolated acini (sometimes normal but generally half-destroyed), a portion of their ducts lying in the middle of the tubercular infiltration. The ducts in especial have a peculiar power of resisting the disease.
the disease and may be seen in various stages of round-celled infiltration both in longitudinal and transverse sections till sometimes represented by a recognisable circular agglomeration of round cells or by a ring of true tubercules. These glands are normally situated in the very deepest layers of the mucous membrane reaching down to and even into the cartilage so that the infiltration rapidly reaches that tissue.

Finally true tubercles with giant cells may be found within the gland capsule. Then the superficial point of the gland or the half or the whole of it may be changed into a tubercle. That the tubercles are formed from the gland is seen from sections in which one half of a gland is seen converted into a mass of round cells while the other remains quite normal.

The blood vessels are also affected by the tuberculous infiltration. When the
disease has only attained a moderate degree one finds on transverse section a rich circular agglomeration of round cells, partly outside the adventitia, but chiefly in its substance imbedded between its fibres.

This condition is never completely absent.

In other sections in the neighbourhood are to be found the earliest traces of formation of tubercles, in the shape of a ring of reticulated tissue in the place of the adventitia of the blood vessels. In advanced cases with numerous tubercles may frequently be found sections of vessels in the centre or periphery of completely formed fresh or caseating tubercles.

In these cases the adventitia is quite destroyed and only a few fibres of the muscularis and the intima remain to preserve the lumen of the vessel. All that remained of a vessel in one case was a crescentic segment, muscular coat and a shapeless
a shapeless mass formed by the remains of the intima. The muscular coat of arteries appears to withstand for a considerable time the advance of the disease, but that of the veins yields much sooner. The lumen may be pressed out of its natural shape and thus obstruction be offered to the return of blood, a circumstance which combined with the destruction of the coats leads not unfrequently in the later stages to a more or less severe hemorrhage.

The capillaries share with the arteries the power of resisting the destructive effect of the round cell infiltration, and their ramifications may be traced almost as clearly as in an injected preparation. They abound as before mentioned in the space which sometimes intervenes between the superficial and deeper layers of tubercular matter.

In the muscular tissue of the vessel cords tubercle is very exceptionally to be met with. It has been seen however as
fush grey tubercle between the muscular bundles, and as an accumulation of round cells even to such an extent as in a transverse section to take up more room than the sections of the fasciculi themselves. Tubercles have been found imbedded among the muscular fibres, and sections of muscular bundles have been seen in the centre of tubercles.

These observations point to the round cell infiltration as probably the earliest stage of the deposition of tubercle. Longitudinal sections of muscles show round cells in rows along the margins of the muscular bundles, and the nuclei of the muscle increased in number, as well as numerous isolated round cells.

Kranke describes an atrophy and fatty change in the contractile substance, the perineurium and the muscular corporcles. The clinical importance of these conditions will be discussed later on.
Post-mortem preparation of case represented fig. III. Numerous membrane polypoid lymphoid, a thickened, b. moistened, surface two small, shallow ulcers. d. A large granular ulcer with raised edges occupied the greater part of the free border and right half of the lingual surface of the epiglottis, extending along the right ary-epiglottic fold and ventricular band. Slight swelling over thyroid; especially the right ventricular band, much swollen and hardened almost obliterated the ventricle. Right vocal cord f. ventricles plicated posteriorly, where they come in contact with the base of the vocal process. Two ulcers in the tongue apparently tubercular ulceration. Both lungs contained tubercular cavities, both epididymis serofulous abscesses.
The harmony of the independent researches of these two observers (Laennec & Virchow) can not but give irresistible weight to the view that the tumefaction of the larynx, characteristic of phthisis, is due to an infiltration in front inflammatory but in great measure composed of that adenoid proliferation which is found in scrofulous subjects to undergo a casious degeneration.

3rd Stage——Ulceration

Ulceration of a very destructive nature is characteristic of what we are describing as the third stage of laryngeal Phthisis.

Of 30 cases of pulmonary phthisis, 147 had ulceration of the larynx, of these 39 presented the microscopical appearance to be afterwards described as tuberculous.

The naked eye appearance of these ulcers will now be described as they occurred in the different parts of the organ.
Epiglottis ulcerated in 26 cases, the ulceration being tuberculous in 24. Therefore as a rule in pulmonary phthisis epiglottic ulcers are tuberculous.

In 21 cases the part affected was the base of the epiglottal surface

3. the borders

1. the apex

1. the whole upper part which was eaten away in the posterior part of the tongue.

In outward appearance the ulcers vary.

They may be shallow, roundish, about the size of lentils with the surrounding parts usually pale. Such ulcers are found chiefly on the upper half of the epiglottal surface. Another form is a large deep irregular ulcer with sometimes tuberculated margins, found chiefly from the middle of the epiglottis down to the base and often continuous with ulceration at the anterior commissure or on the aryepiglottic folds or ventricular bands.

Any epiglottic folds were ulcerated at times, in all cases tuberculat consequent to tubercular infiltration.
infiltration.

In appearance superficial, lying in the direction of the folds. Any tenoid cartilages ulcerated in 23 cases the ulceration being tuberculous in 22 cases not 1 case Base + lower part (including inter-arytenoid space) affected 13 times Apex + upper part 15 times The deepest are those at the base reacting usually to the cartilage leading to maceration + loosening.

Those on the surface are usually most extensive on the laryngeal surface and in the interarytenoid space. They are numerous small superficial, either confluent or close together and perforating the mucous membrane in a cribiform manner. The form is quite irregular, the borders smooth or tuberculated; the base rough as a rule, sometimes covered with dirty grey material. Ventricular bands were ulcerated in 14 cases, tuberculous in 13 cases, non-tuberculous ulceration in 1 case.
Ventricles were ulcerated in 12 cases, all ulcerations.

Vocal cords: 40 cases.

Complete destruction of vocal cords in 11 cases.

In 5 of these on both sides; in 6 cases on one side only.

Partial ulcerations in 26 cases.

Complete destruction of vocal cord

Ulceraæ at vocal process

As the posterior extremity

Along the whole cord

At the anterior two-thirds

At the middle

Right | Left
----|----
8  | 7  |
11 | 9  |
5  | 5  |
2  | 2  |
1  | 1  |

In life the affected spots always present a greater or less degree of reddening. If the edges are ulcerated they lose their sharp smooth contour which appears frequently notched and as if set with small elevations, and instead of their straight course show a pitch-shaped excavation. On the surface of the vocal cords the ulcerations in an early stage take the form of narrow longitudinal fissures with normal mucous membrane on each side. Early ulcerations in the neighbourhood of the vocal processes form around them shallow ex-

Erosions perpendicular to the plane...
plane of the glottis which in phonation leaves an aperture at the affected part.

In a more advanced state of ulceration the vocal cord appears often split up in several places into two or three parts like as many terraces lying close one over the other, presenting numerous tooth-like elevations. The deepest layer corresponds to the original vocal cord of the opposite side in attempted phonation.

When the ulceration reaches its highest degree, the contours of the cords are no longer distinguishable, and the thick muscular body is replaced by one or more small narrow ledges. They are incapable of effecting a closure of the glottis and occasionally the ventricular bands are seen to come together to close the glottis and even to produce a sound though croaking sort of tone.

Out of these 40 cases of ulceration of the vocal cords, 32 were of tubercular nature, & 8 not so. As in other parts of the language these two kinds of ulcers could not be distinguishcd from one another by simple inspection.

Let us
Let us now consider the positions of the ulcerations generally and of the tubercular and non-tubercular ulcerations respectively.

1. Ulcerations in general were found in 49 cases of laryngeal ulceration on vocal cords in 40 cases or 81.6%

- in 26 cases 53.1%
- arytenoid cartilages 23 46.9%
- ventricular bands 14 28.5%

in ventricle and on the inner surface of the cri- coid cartilage 12 24.4%

2. The ulcerations were tubercular:

on the ary-epiglottic ligaments and in the ventricles in all cases of ulcers in those parts

on the arytenoid cartilage in 23 out of 23 cases or 95.6%

- ventricular bands 13 14 92.8%
- epiglottis 14 26 92.3%
- inner surface of cricoid 11 12 91.6%
- vocal cords 32 40 80%
- trachea 18 26 69.2%

3. The ulcerations
The ulcerations were non-tubercular on the trachea in 8 of the 26 cases, or in that part of 30.7%.

- Vocal cords: 8/40 = 20.0%
- Inner surface: 1/12 = 8.3%
- Epiglottis: 2/26 = 7.6%
- Ventricular bands: 1/14 = 7.1%
- Arytenoid cartilages: 1/23 = 4.3%
- Any epiglottic ligaments + in none of the cases.

When we look at the parts mentioned in the second list as the most constant seats of tubercular ulceration, viz., any epiglottic ligaments, ventricles, arytenoids, ventricular bands, base of epiglottis, we notice that they are those where the mucous membrane is loose or where the submucous tissue is most abundant either over or between the cartilages. On the other hand, we see a comparative absence of tubercular ulceration in regions such as the vocal cords and the cartilaginous portion of the trachea, where the mucous membrane is tightly stretched, and the space, thereby afforded, necessarily limited. Again we must...
Submucous relaxation of the inner surface of the epiglottis near the base of epithelium quite normal up to the margins of the ulcer, s, extending through the duct of a gland; below it another denudation but of larger size; c, m, f, labraces; c, a tubercle with central congestion; g, glands with the central part destroyed by the tubercular infiltration; the marginal portions containing well preserved adenæ; l, layer of glands; p, far left, section of a large bladder; k, cartilage.
Must also bear in mind that these are exactly the parts singled out by Geitler as those in which the adenoid tissue is found in greatest abundance, and therefore those where we should most expect to find the encroachments of tubercular disease.

The ulcers, we have mentioned above as being of two kinds—tubercular and non-tubercular. We shall now consider the microscopic characters by which these are to be distinguished.

1. Tubercular ulcers according to Geitler include those which present the characteristics of the three following classes.

1. Those which contain tubercles in their borders or bases. These are according to Geitler by far the majority occurring in 71.8 per cent of the cases of tubercular ulceration. They may or may not be accompanied by tubercular infiltration or even any change whatever in the surrounding mucous membrane.

2. Those which while they present no
well-marked tubercles contain in their walls or bases, giant cells lying free or else in an infiltrated and reticulated tissue.

3. Those which present in themselves none of the chief evidences of tubercle, but in the same microscopical section with which we see decided evidence of tubercular deposit and such changes as we may look upon as the earliest stage of tubercular ulceration. The absence of tubercles from the surface of the ulcer is explained by the tendency these have to break down and be thrown off, leaving a simple breach of surface. All forms of tubercular ulcer have in many cases a great increase of epithelium at the margins, with processes growing into the mucous membrane.

The ulcerative process as a rule starts with an infiltration of the mucous membrane generally or of a part of it only or with a minute deposit of tubercle in a mucous membrane otherwise unaffected. An uplifting of the epithelium takes place.
A tubercular mass on the point of being thrown off from the margin of an ulcer of the thyro-epiglottic ligament infiltrated with tubercle. a. Epithelium in part normal, in part already torn in shreds by the pressure of the tubercle mass. b. Remains of a blood-vessel in section. c. Tubercles, in part with giant-cells. d. Surface of the ulcer on both sides.
place until the tubercle reaches the undersurface of the epithelial layer, but when this stage is reached a pressure is exercised that the upper layers split up and the cells of the deeper layers separate so as to permit the advance of the tubercular deposit between them. A splitting thus takes place on the surface and this rapidly becomes a funnel-shaped aperture. Next, by the throwing off of tubercles + tubercular tissue, for both are formed ulcers of various shapes & sizes.

In cases where there is tubercular infiltration masses containing a number of tubercles and remains of tubercular tissue along with (not unfrequently) half destroyed glands with remnants of their ducts are separated from the borders and bases of the ulcers. When on the other hand infiltration is not present and solitary tubercles are deposited in the most superficial layers of the mucous membrane (close under the epithelium), on the ex-
clusion of the tubercle there remains simply a loss of tissue which presents nothing to point out its origin and is not necessarily followed by any deep destruction but may end when the tubercle has been thrown out. Should however, this occur very frequently or should tubercular deposition go on simultaneously in the deeper parts of the mucous membrane, then the results are the same as in the case previously described.

These solitary tubercles are found chiefly on the ventricular bands especially the under surface forming the roof of the ventricle, frequently also the free border, as sometimes the floor of the ventricle in the saccusus at some distance from the free edge of the true vocal cords. In these places the mucous membrane is very loose and in conjunction with the presence in them of tubercles close under the epithelium (which may be quite whole) there are commonly found very superficial
Superficial ulcers on the surface of the vocal cords. From this it appears more than probable that these latter depend upon the same process. This view is borne out by the sections through the larynx and vocal cord in one of Heinze's cases. In one was seen a tubercle deposited beneath the epithelium at the same place which in a further section presented a loss of tissue with a collection of round cells in considerable quantity which could not a priori be determined to be specific. In all the sections the tubercles were unaltered.

2. Non-tubercular Ulcers are quite superficial being merely describable as erosions consisting in a breach of surface without the distinguishing cellular structures described in the definitions of the three kinds of tubercular ulcers. That such ulcers are found along with pulmonary phthisis is undoubtedly. They are certainly exceptional and...
Fig X.

Larynx (opened from behind) of race represented in Figs. 5 to 6, after death (Dec. 4th, 1878). Membrane inner side of vocal cord had several follicular elevations on true vocal cord and epiglottic folds. St. Thickened and associated with numerous small pin head elevations over the surface. Right ventricular band C. Much thickened large ulceration with tubulated edges and granular floor occupying the position of the left ventricular band. Various excavations in inner surface of right arytenoid cartilage E. Upper half of the left arytenoid cartilage converted into a calcareous nodule lying loose in an abscess cavity behind. The lower half gritty & brownish, the joint disorganised. There was a cavum cavity in a condensed portion of the thyroid cartilage on the right near arytenoid cartilage. The surfaces of that joint were ulcerated. Both lungs contained numerous tubercular cavities.
and if the absence of the so-called tubercular element has to be accounted for in order to support the view of the identity of the laryngeal & pulmonary disease, the following considerations will suffice to do so. Firstly, ulcers not originally tubercular may only become so from tubercular deposition in more advanced stages of the pulmonary disease. Again the absence of tubercle may be due to the throwing off of the tubercles or masses of tubercular material as before described, and death having occurred previous to any fresh deposition. The comparative frequency of non-tubercular ulcers on the vocal cords may then be owing to this latter cause the frequent movements which these parts undergo, favouring the expulsion of the tubercular matter.

4th Stage — Perichondritis

& Necrosis

As the tubercular disease proceeds the perichondrium becomes infiltrated with pus cells.
cells and thereby separated from the cartilage which thus laid bare becomes softened, broken up, necrosed, or partially ossified and surrounded by a quantity of pus or ichor. When the cartilage becomes ossified and its vascular connections are still retained it may undergo a process of caries. The connective tissue surrounding the bare cartilage may be considerably thickened and necrosed.

The cartilages most frequently affected are the arytenoids and the cartilages of Santorini.

The most exposed portion is certainly the vocal process of the arytenoid cartilage, and there is very great danger of ulcers of the vocal cords spreading backwards and causing it to be laid bare. In the same way ulcers on the posterior wall of the larynx lead to perichondritis of the upper part of the arytenoid cartilage and the cartilages of Santorini - Krisberg.
In this case it is usual to have a great amount of edematous swelling of the mucous membrane. (Fig. 5. a. b.)

The whole arytenoid cartilage may be affected from the extension of ulcers on the vocal cord and posterior wall of larynx at the same time, and with a further advance the cricoid undergoes the same change.

When softening takes place, the semi-transparent appearance of the cartilage is lost; it takes on a dirty yellow or brownish tinge, becomes gelatinous or tears down into a granular mass.

On the other hand, a calcareous change may occur and the affected portion of cartilage lie loose in the surrounding tissues. In else a carious cavity may form in the condensed piece of cartilage, as in the case we have just described.

The formation of a considerable abscess is very usual where the perichondritic process is carried on in the deeper parts.
I have recently seen a case under the care of Dr. Cawdrey, Thomas at the General Throat and Ear Hospital in which there is necrosis of the left plate of the Thyroid Cartilage. In this instance there was to be seen a large globular swelling external to the larynx which gave all the appearance on palpation and the indications of fluid but on puncture thereof there was speedy collapse with a rush of air and escape of but little purulent matter. This phenomenon occurred twice and clearly indicated a communication with the ventricle of the larynx.
parts. In this case there may be a globular abscess bulging backwards into the pharynx, forwards above or below the vocal cord & upwards into the superior aperture of the larynx.

With or without this abscess formation a necrosed portion of cartilage is frequently expelled by coughing leaving afterwards a subsidence of the soft parts.

Schröder has seen holes through which such sequestra had made their exit.

Ulcerations on the anterior wall may in like manner cause perichondritis and partial necrosis of the thyroid cartilage. The perforation of the cartilages by the processes described has been known to lead to emphysema of the neck as in a case reported by Dr. Wilkes. A pneumatocele described by Hutchinson appears to be due to this process.

Perichondritis is characterized by the presence of a number of pus cells in the perichondrium surrounding the cartilage and
and tending to loosen it from its connections.

The cartilages themselves become next attacked the process differing in the hyaline and yellow fibro-cartilages respectively. In the former there is a fine granular infiltration of the intercellular substance followed by softening, fatty degeneration and disintegration.

In the yellow fibro-cartilage there is purulent infiltration of the network of elastic fibres enclosing the cartilage cells. In both the cartilage-cells become in this way separated and finally undergo a destructive fatty degeneration.

Steinze found perichondritis in no case of unequivocally non-tubercular ulcer. It appears to be the constant sequel of tubercular ulcer of long duration.
Laryngeal Phthisis.

Etiology.
The predisposing causes of laryngeal phthisis are the same as those of phthisis in general and need not be dwelt on here.

The causes exciting the outbreak of the disease in the larynx especially are more to our present purpose. Statistics have been drawn up in order to clear up this point chiefly as regards the age, sex and occupation of the patients.

As regards the age, laryngeal complications take place in phthisis in a much larger proportion of the cases of phthisis between the ages of 20 and 30 than in any other decade of life.

In respect of sex, men are far more frequently affected than than women, especially at the age mentioned. It is found that the nearer the extremities of life the greater liability of the male sex becomes much less prominent.

Statistics respecting the occupations of the sufferers have been carefully collected by Reenge who arranged them in classes according
according to the frequency with which laryngeal ulceration occurred in them when affected with phthisis. We shall only quote the three classes presenting the highest proportions:

<table>
<thead>
<tr>
<th>Class</th>
<th>Cases of Phthisis</th>
<th>Larynxes Affected</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butchers</td>
<td>7</td>
<td>6</td>
<td>85.7%</td>
</tr>
<tr>
<td>Musicians</td>
<td>11</td>
<td>6</td>
<td>54.5%</td>
</tr>
<tr>
<td>Singers</td>
<td>3</td>
<td>6</td>
<td>83.3%</td>
</tr>
<tr>
<td>Tailors</td>
<td>49</td>
<td>23</td>
<td>46.9%</td>
</tr>
</tbody>
</table>

In the first two groups the numbers are almost too small to make a good average, but the third is certainly very significant.

In the case of the butchers excessive animal diet, probably proportional amounts of stimulants, early wakeful open air shunting may afford a cause.

Among the singers it is to be noted that the class of singers chiefly affected was those of the open-air or beer-garden order. The over-exercise of the voice under circumstances of exposure gives here a very evident clue to the causation.

The
The high percentage among tailors is not thus explicable. It must be due in their case to confinement and want of exercise on the one hand and on the other to the tendency there is among poor parents to select the trade of a tailor for any son whose feeble physique renders him unfit for more laborious work.

Therefore as the causes which lead to the supervision of lung-gangrenous disease in phthisis we may briefly describe, those influences which throw undue strain on the throat and those influences which depress the vital power. The proximate causes have been variously interpreted. Thus the disease has been attributed to, tubercular deposition, to follicular inflammation, to mechanical friction in a morbid mucous membrane, to irritation or injection by irritating potutum.

Of the tubercular theory (in the widest sense) as supported by Porter and Cambert and so fully demonstrated by Haeinze, nothing more need be said.
With regard to the view that follicular inflammation is the sum substance of laryngeal phthisis, Rindfleisch has made observations which point to its constant occurrence in that disease, the confluence of adjacent follicles accounting for the wide spread destruction of tissue, while the seat of the follicles in the submucous and perichondral tissues is ample reason for the depth of the ulcerations.

Now these follicular inflammations are what we find in simple laryngitis without leading to the destruction we find in phthisis. There is something more required. Rindfleisch goes on to state that in the neighbourhood of the ulcers of the larynx and epiglottis be found round collections of cells about the size of a glandular acinus which from their behaviour in respect to carmine staining, reminded him very much of mycobacteriiae. These he looked upon as an earnest of the dependence of the ulcerative processes on a tubercular origin.
A very ingenious theory has been advanced by Pkeiner to the effect that the ulcerations are in great measure due to the friction of parts, seeing that they take place by preference in those spots where there is most mechanical disturbance. Thus we see ulcers on the ary-epiglottic ligaments from the rubbing at those parts, on the laryngeal surface of the epiglottis and the points of the arytenoids where the epiglottis impinges during deglutition. In a similar way he would account for the ulcers on the lips of the vocal processes and on the inner surfaces of the arytenoid cartilages.

This can only occur when the vulnerability of the tissues is abnormally increased as it would be in tubercular subjects. However he found other ulcers in the cases of laryngeal phthisis which seemed to him to arise from a kind of tubercular granulation, although he found no instance of the presence of cheesy tubercle.

The corrosion of the mucous membrane...
the implantation of tubercle by the irritative
expectoration was put forward by Louis as
the Cause of the ulcers of the larynx. In
support of this he urged the point that the
positions of the ulcers were those with which
the sputum was in contact for the longest
time (as for instance the inner surface of
the epiglottis, the commissures of the vocal
cords, the bases of the arytenoid cartilages +
the membranous portion of the trachea).

Certain flat superficial ulcers of consider-
able extent are described by Liemsen as
occurring in phthisis (but only in phthisis)
These he has been able in several cases
to trace along the bronchial tubes into the
Cavities. He believes that these ulcers are
formed shortly before death and that they are
due to the corrosive action of the secretion of
the Cavities. We cannot accept this corrosion
as being the Cause of any other of the forms of
ulcers. If the ulcerations were simply due
to the irritating nature of the discharge
we should find it, as we do now, in cases of
fetal.
fetid bronchitis and of gangrene of the lungs. Again we should never find ulceration previous to the formation of secreting cavities, whereas the contrary is quite a common clinical observation. From another aspect were the spectrum of phthisis of an infectious nature, the quantity of it swallowed by the patients would make tubercular ulceration of the stomach quite common instead of the rare occurrence it now is. The probability of any implantation of tubercle is negatived by the fact that tubercular infiltration may attain a considerable extent without any interference with the normal condition of the epithelium of the mucous membrane over it.

We may therefore say the local changes in laryngeal phthisis are due to the infiltration of the parts with a small-celled material of a quasi inflammatory nature, but of low vitality. This material causes a degeneration of the various tissues leading to destructive ulceration. This process selects by
by preference those parts where the adenoid tissue is in greatest abundance. The glandular structures are suitable means for the extension of the ulcerative process in breadth and depth.

Consumption of the throat is identical in its essential nature with consumption of the lungs. To this disease the name of tuberculosis is applicable provided we do not restrict the meaning of that term to the deposition of grey miliary tubercles and the subsequent caseation of the same.
Laryngeal Phthisis

Diagnosis.
The diagnosis of Laryngeal Phthisis is important from two points of view. Firstly, from its occurring in an unmistakable manner in many cases before the advance of the disease in the lungs, it enables us to detect that condition at a stage when treatment may be adopted with a hope of success, while at the same time it puts us in a position to give a prognosis unlikely to be belied by future events.

The chief points in the clinical history on which the diagnosis is to be founded are the diathermic peculiarities, the cough, loss of voice, occasional embarrassment of respiration, the dysphagia, at first for fluids, then for solids also, pain on pressure over the larynx, the pulmonary lesions when present.

1st Stage——Anemia

In the early stage it is to be diagnosed from
Of course as in the lungs a simple catarrhal laryngitis may in process of time, take on a specific character.
from catarrhal laryngitis. In the latter there is a general redness without any surrounding area of pallor and the vocal cords are red from the compound hyperemia; but in phthisis it is generally in patches, especially at the posterior commissure, surrounded by a general pallor, and the vocal cords are of a dull purplish-gray hue. In ca
tarh if edema occurs, it is red, in phthisis it is pale. Ulcerations in catarrh are very exceptional but early in phthisis they occur on the vocal cords and posterior commissure.

2nd Stage—Tumefaction.

Tumefaction, when of the typical character as described, is absolutely diagnostic of the disease and can hardly be mistaken for syphilitis. It is to be distinguished by the occurrence of dysphagia and by the swelling preceding the ulceration, whereas in that disease the ulceration comes on early, without any previous considerable degree.
durable degree of infiltration. The history and pharyngeal signs of syphilis need only be mentioned. It may here be noted that in syphilitic cases there is a decided degree of insensibility of the throat, whether to laryngoscopy or other irritation, as compared with the hyperaesthesia present in phthisis. Cancerous swelling usually commences in the framework of the larynx. It rapidly ulcerates and is accompanied by acute pain apart from functional acts.

3rd Stage—— Ulcercation

Phthisical ulceration is recognised chiefly by the following marks.

1. Portion: Ulcers on the epiglottis, on the ventricular bands in the ventricles, at the anterior commissure, on the ary-epiglottic ligaments and on the vocal processes are in very high degree suspicious. Ulcerations on the mucous membrane covering the points of the arytenoid cartilages scarcely ever occur without simultaneous tuberculous infiltration.
3. The simultaneous affection of several of these localities.

3. The intensity of the ulcerative process, as shown by the depth of the ulcer, degree of the interference with the normal tissues, and with the natural configuration of the larynx, the laryngeal cartilage, destruction and extrusion of cartilages.


5. The previous existence of tubercular infiltration removes all doubt as to their nature. Syphilitic ulcerations are to be distinguished by their being primarily a pharyngeal disease, by the absence of thickening, by their superficial position, by the wide areola of redness surrounding them, by their tendency to affect at the same time the anterior border and lingual surface of the epiglottis and by their usually affecting both the vocal cords. These are the best supports of what we find in phthisis. A less important point of distinction is the early hoarseness of syphilis as compared with the aphonia of phthisis.
When cancer occurs with the larynx it is as a well defined unmitigated ex-

cence.

Typical example of Cancer of larynx illustrating the extent of the destruction of the epiglottis etc. after Tounse.
Lastly, in very doubtful cases the yielding of the disease under the administration of large doses of iodide of potassium or mercurials (carefully watched), along with the local application of caustics affords a therapeutical diagnosis of unquestionable weight.

Cancer is also to be carefully eliminated. In cancer the framework of the larynx is the part usually affected; the tumefaction is irregular, the colouration of the ulcers and the surrounding tissues an angry red, there is a displacement of the parts, with disarrangement of the corresponding lymphatic glands. The early onset of dysphagia and pain in the larynx (often running up to the ear) independent of pressure or functional movement prior to any change in the voice are symptomatic of cancer.

Should the patient be about 50 years of age and of cachectic appearance with a loss of weight and flesh more rapid than in cases
in cases of phthisis, these facts along with the above-mentioned characteristics remove all doubt as to the nature of the disease. The conditions present in phthisis offer to these a complete contrast.

The rare fusions of the larynx as described by Schönk and Hennsen with its wart-like growths and losses of substance from the centre of the free edge of the epiglottis is not likely to be mistaken for phthisis.

1st Stage—Perichondritis and Necrosis.

Perichondritis and necrosis subsequent to phthisical ulceration certainly do not occur before well-marked phthisical changes in the lungs.
The prognosis in cases of laryngeal phthisis is dependent on the degree to which the lungs are affected. Platt is in fact never due to the laryngeal disease alone but to the effects of the pulmonary + general disorder.

The detection of laryngeal phthisis as before described puts us in a position to prognosticate the superevation sooner or later of consumption of the lungs. According to Scowen Mackenzie (voice lectures) when once laryngeal phthisis is diagnosed the utmost duration of life is two years, a limit much extended in the except of other authors. The presence of this disease in the larynx marks the prognosis in a case of pulmonary consumption as the more unfavourable.

That laryngeal ulcerations in phthisis do at times heal is a fact witnessed by Siemens. They both during life and after death, the cicatrices being found in two cases of the
post-mortem examination.

The significance of such a result is very slight when we consider that it is only followed by fresh deposition and fresh ulceration.

Under appropriate treatment the sufferings of the patient may be alleviated and his condition somewhat improved, but the prognosis is uniformly unfavourable though the disease may Evans several exacerbations and regressions before it finally comes to a fatal termination.
Laryngeal Phthisis

Treatment
The treatment of laryngeal phthisis is both general and local. According to the various stages of the disease it is prophylactic, curative or palliative.

In the way of prophylaxis, in any case where there is a presumption of a tubercular tendency, the patient should avoid exposure, exercises, and especially sedentary occupation. He should on no account strain the voice and for this purpose should acquire the art of breathing according to the principles of rational elocution. Complete rest of the voice is imperative when any catastrophic affection is present.

1st Stage — Anaemia

The constitutional treatment in this stage is that of early consumption. In the experience of the writer great benefit has accrued from the use of cod-liver oil and the Tryptophins, with Hydrocyanic Acid or Morphine to reduce the cough. The injurious effect on the chest of an
an uncheckt cough, per se, are well-known. The improvement in the general symptoms when the cough is stopped is sometimes very remarkable.

As a striking instance we may mention the case of a man who with well-marked phthisis of the larynx & lung had an elongated euola which kept up an almost constant cough. The atation of the tip of the euola was followed not only by a great modification in the frequency & severity of the cough but by a considerable amelioration of his general condition and actually an improvement in the right apex where the pulmonary disease lay.

Locally inhalations are of service. Those of a stimulating character such as Benzole or Treacle are best when the aphonia is the main symptom, but sedative inhalations such as Hop & chloroform when the irritation predominates.

Brushing the larynx with a solution of ammonium and iron has been recommended for the anemia & chloride of zinc for the
2nd Stage — Tumefaction

The general treatment is the same. Locally little or nothing can reduce the tumefaction. Incisions as above mentioned merely lead to ulceration. Isambert found benefit from the galvanic current. Much can however be done in treating the symptoms. The dysphagia for fluids may be overcome by causing the fluids to be thickened with gum powder or some other material. The local application of chloride of zinc as an astringent is advisable, and in the event of great edema, Chronic Acid.

3rd Stage — Ulceration

Orthosia ulceration is characterized by its resistance to treatment. The suppurative condition of healing and cicatrisation after the excision of the tuberculous nodules has been observed by Isambert and by Lievens. The latter considers it very rare and sure to be followed by renewed ulceration. Isambert promises great relief from the pain + dysphagia after the
the evacuation of the tubercles an event much hastened by the otherwise soothing application of glycerine and morphia; but much less favourable results took place under the action of caustics an opinion fully in accordance with the writer's experience.


When paranchondritis and necrosis come in this disease we are reduced to content ourselves with palliating the patient's suffering and with keeping up his nutrition. Morphia is here our mainstay. Given in the form of a lozenge such as the 'Hexo. Sycac. F.' Morphi. 13. P. or prunited internally dissolved in glycerine it allays the pain & the dysphagia which would otherwise inhibit the swallowing of food and bring about a speedy death from emaciation.

When other materials cannot be consumed, it is found that a raw egg thrown into a glass and flavoured with salt & vinegar can be gulped over with comparative ease.
This practical detail proves the means of postponing a specially imminent dissolution in many cases of dys-
phagia & odynophagia.

The mucilaginous ice is agreeable to the patient, in all stages and in all cases of bleeding its
haemostatic effect makes it doubly useful, spray
of tannin also fulfil this latter requirement.

Throughout the whole course of the disease the
principles of treatment with regard to hygiene,
change of climate, alimentation and internal
medication are exactly such as hold good
in consumption of the lungs.

Should the symptoms of laryngeal stenosis
threaten life, the pulmonary lesions being so far
comparatively slight, tracheotomy may be per-
formed. The latter condition is rare and as
there is a great tendency to ulceration of the tra-
chea, the operation is in the last degree inadvisable.

Family or other reasons may make it necessary
to endeavour to prolong life for a few days, as of
hazards, in which case it is right to perform tra-
cheotomy.

As regards the efficacy of tracheotomy,
Laryngeal Phthisis differs thus very much from other causes of stenosis of the larynx (as chronic laryngitis, traumatic structures) in which the reose to the larynx sometimes hastens recovery, while at other times the wearer of the cannula may respire through it for many years.