

Diseases of the nose and throat / by F. de Havilland Hall and Herbert Tilley.

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Publication/Creation

London : H.K. Lewis, 1901.

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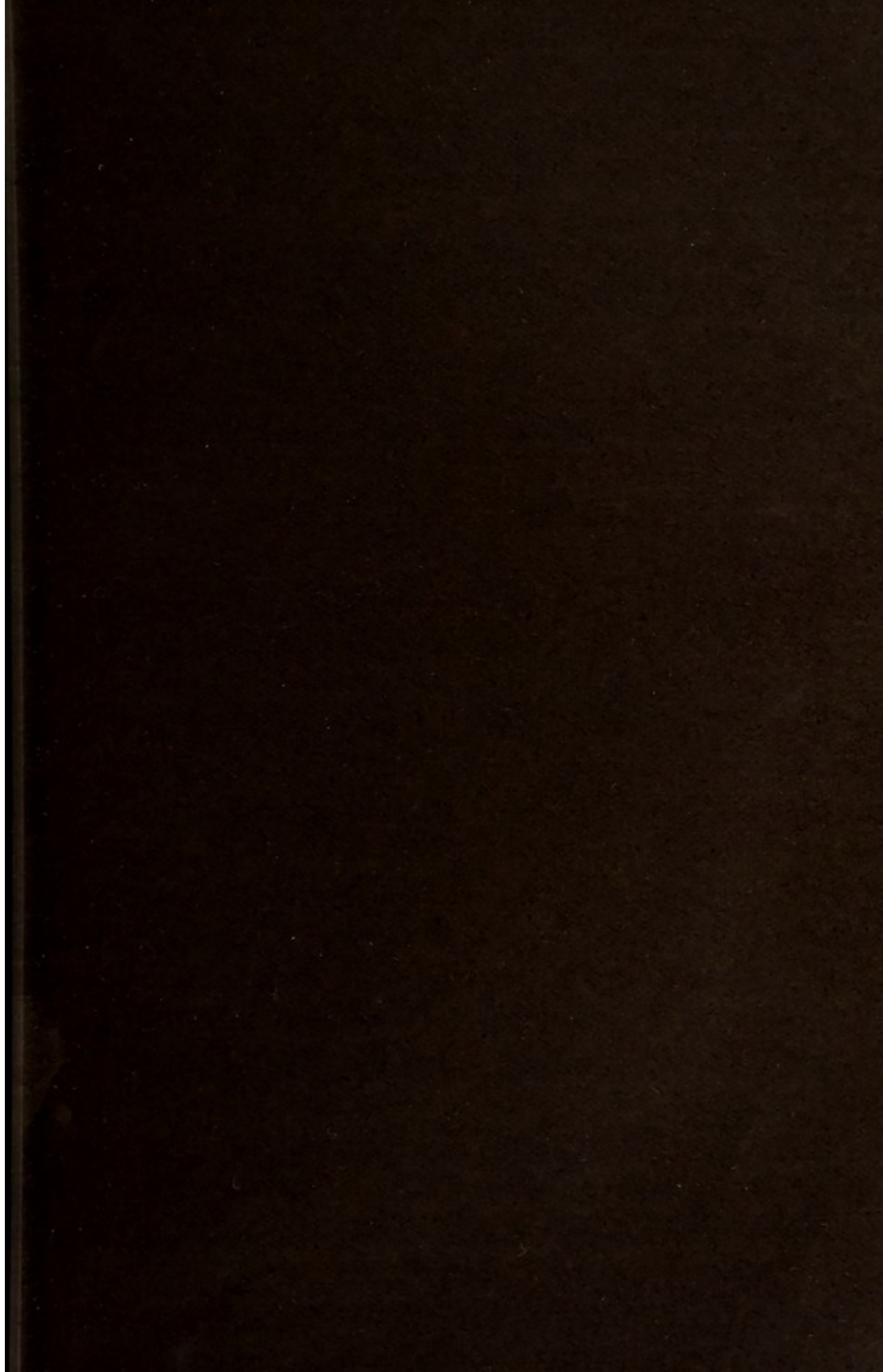
DISEASES OF THE
NOSE AND THROAT



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AND
HERBERT TILLEY

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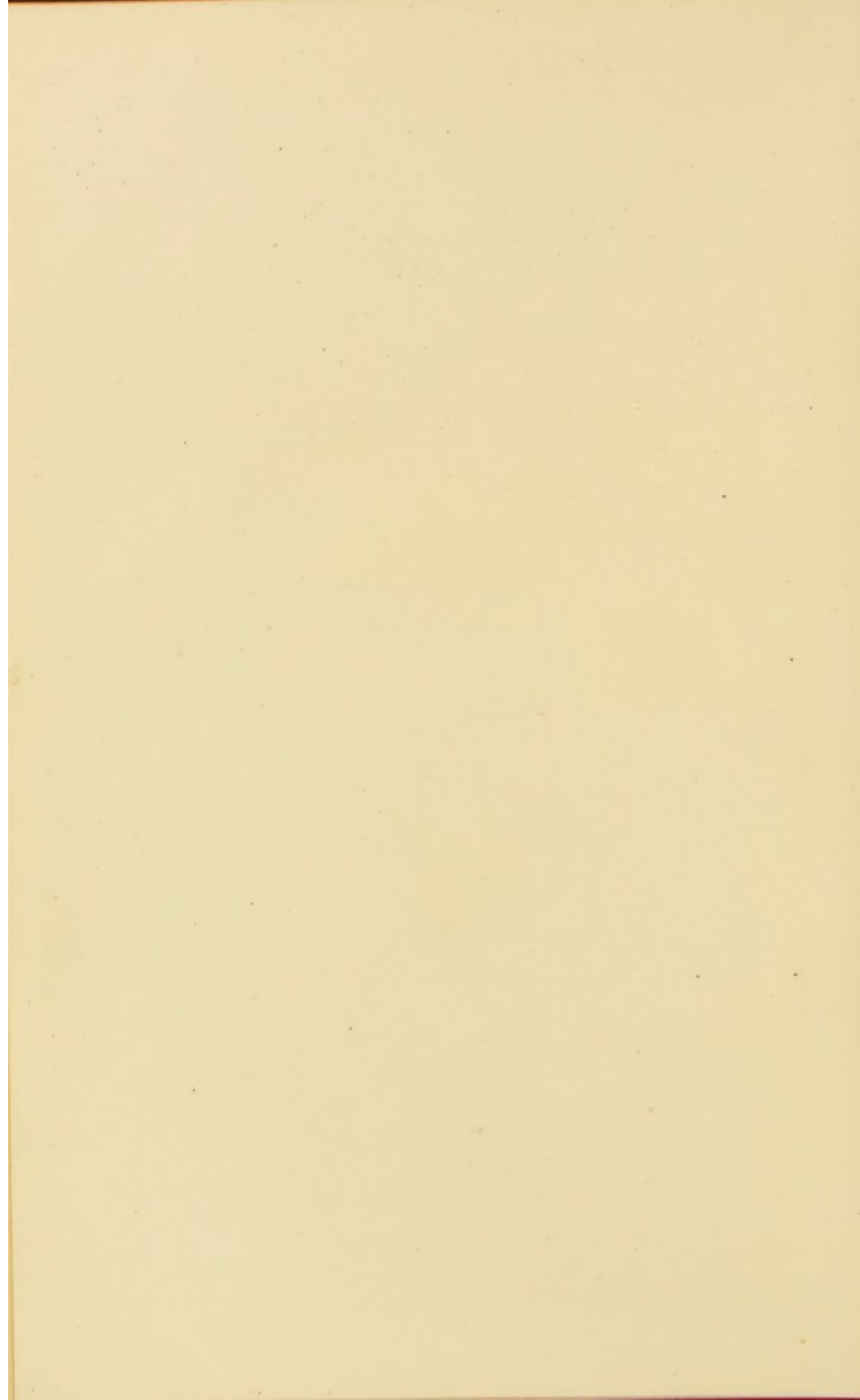




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DISEASES

OF THE

NOSE AND THROAT

BY

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SURGEON TO THE THROAT HOSPITAL, GOLDEN SQUARE;
LECTURER ON DISEASES OF THE NOSE AND THROAT, LONDON POST-GRADUATE
COLLEGE AND POLYCLINIC

Second Edition

WITH 2 COLOURED PLATES AND 80 ILLUSTRATIONS

LONDON

H. K. LEWIS, 136 GOWER STREET, W.C.

1901

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H. K. LEWIS, 136 GOWER STREET,
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PREFACE.

THE present volume is larger than the first edition by more than fifty pages, and the number of illustrations has been considerably increased. Special attention has been directed to the various surgical procedures, the articles on diseases of the accessory sinuses have been entirely rewritten in order to bring them up-to-date, and the other articles have been carefully revised. The references to the various authors quoted in the text have been omitted as they were considered unnecessary in a practical hand-book.

F. de HAVILLAND HALL.

Wimpole Street.

HERBERT TILLEY.

Harley Street.

January, 1901.

CHAPTER II

The first of the two main branches of the subject is the study of the history of the human mind. This branch is concerned with the development of the mind from its earliest stages to the present time. It is a study of the growth of the mind, of the changes which it undergoes, and of the factors which influence its development. The second main branch of the subject is the study of the nature of the human mind. This branch is concerned with the question of what the mind is, and what its functions are. It is a study of the mind as it exists in the present, and of the various faculties which it possesses. The study of the history of the human mind is a study of the past, while the study of the nature of the human mind is a study of the present. Both of these studies are essential to a complete understanding of the human mind.

The first of the two main branches of the subject is the study of the history of the human mind.

This branch is concerned with the development of the mind from its earliest stages to the present time.

It is a study of the growth of the mind, of the changes which it undergoes, and of the factors which influence its development.

The second main branch of the subject is the study of the nature of the human mind.

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* By kind permission of Dr. Dobell.

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DISEASES OF THE NOSE AND THROAT.

PART I.

DISEASES OF THE NOSE, ACCESSORY SINUSES, AND NASO-PHARYNX.

1. THE EXAMINATION OF THE NOSE.

Anterior and Posterior Rhinoscopy.

THE examination of the anterior nares is termed anterior rhinoscopy; that of the posterior nares, posterior rhinoscopy; for both kinds of examination, the reflector and light used for illumination of the larynx are employed.

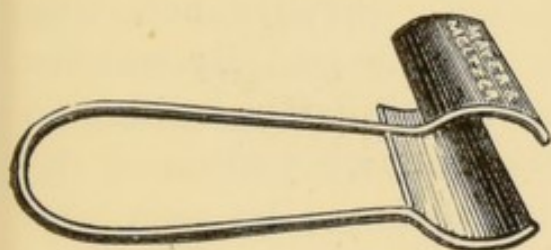


FIG. 1.—Thudichum's Nasal Speculum.

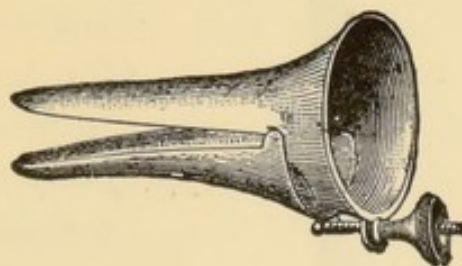


FIG. 2.—Duplay's Nasal Speculum

For **Anterior Rhinoscopy** the specula usually employed in this country are Thudichum's and Duplay's bivalve specula (figs. 1 and 2). The spring of

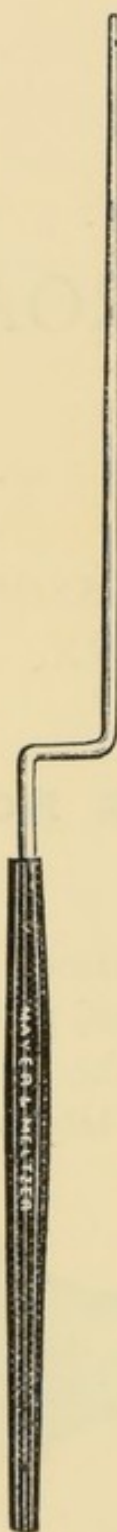


FIG. 3.—Cotton-wool Holder.

Thudichum's speculum may be so stiff that patients complain of the pain caused by its introduction; but when once the "knack" of using the instrument has been acquired the surgeon can always prevent any discomfort to the patient during its use. Two sizes should be kept. Duplay's speculum is most suitable for general use, other kinds being only necessary for exceptional cases. For the examination of infants' nostrils, Gruber's oval ear specula will be found most convenient.

After the condition of the front of the nostril and the turbinated bodies has been inspected, the application of a ten per cent. solution of cocaine by means of cotton wool firmly twisted round a suitable holder (fig. 3) and saturated with the solution will facilitate the view of the posterior part, by causing contraction of the mucous membrane, and thereby increasing the size of the passage. By anterior rhinoscopy, the inferior turbinated body and the anterior portion of the middle turbinated can be seen, and occasionally a glimpse of the upper turbinated is obtained. The term "*turbinated body*" is applied to a turbinated bone *plus* its covering of soft tissues. *Turbinal* is used in the same sense. The condition of the passages and also the state of the septum

can be inspected. In order to appreciate what is seen, the observer must habituate himself to the examination of noses both in health and disease, for it is only by comparison that it is possible to distinguish the normal from the abnormal, as the arrangement of the turbinated bodies, the direction of the meatuses, and the position of the septum vary greatly. At this early stage we cannot too firmly impress upon the student that an ideal nasal cavity is not common, and that many slight irregularities of the turbinals and the



FIG. 4.—Anterior rhinoscopic view showing Anterior Extremities of middle and inferior turbinals.

septum are within physiological limits and may have no pathological significance whatever.

Posterior Rhinoscopy is a much more difficult task than the anterior examination, as there are a certain number of persons in whom, on account of the conformation of the naso-pharynx, it is quite impossible to obtain a satisfactory view, or in some cases any view at all, of the posterior nares. Three chief difficulties are met with. The first, a hard palate which extends so far back towards the posterior pharyngeal wall that there is no room for the introduction of the mirror.

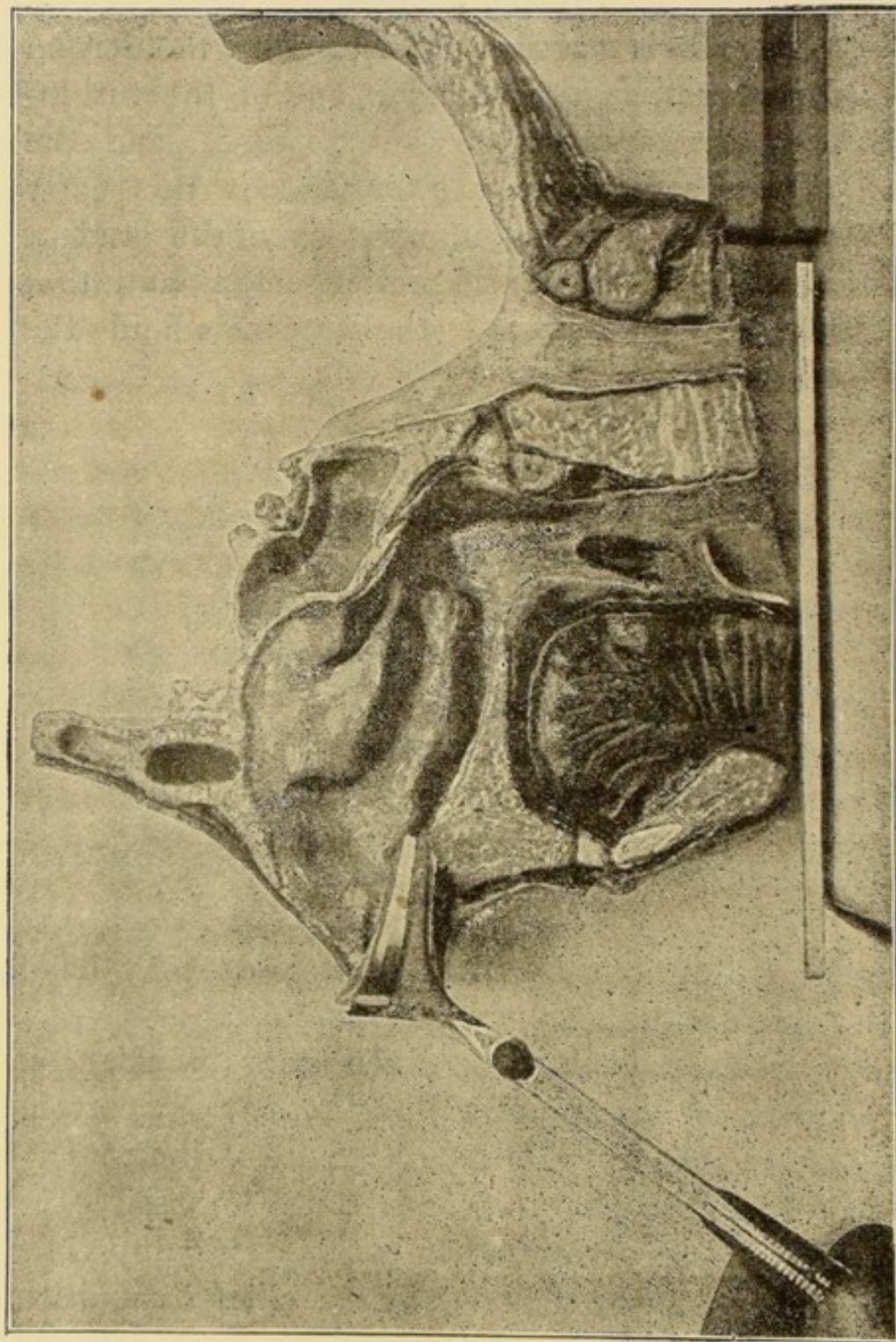
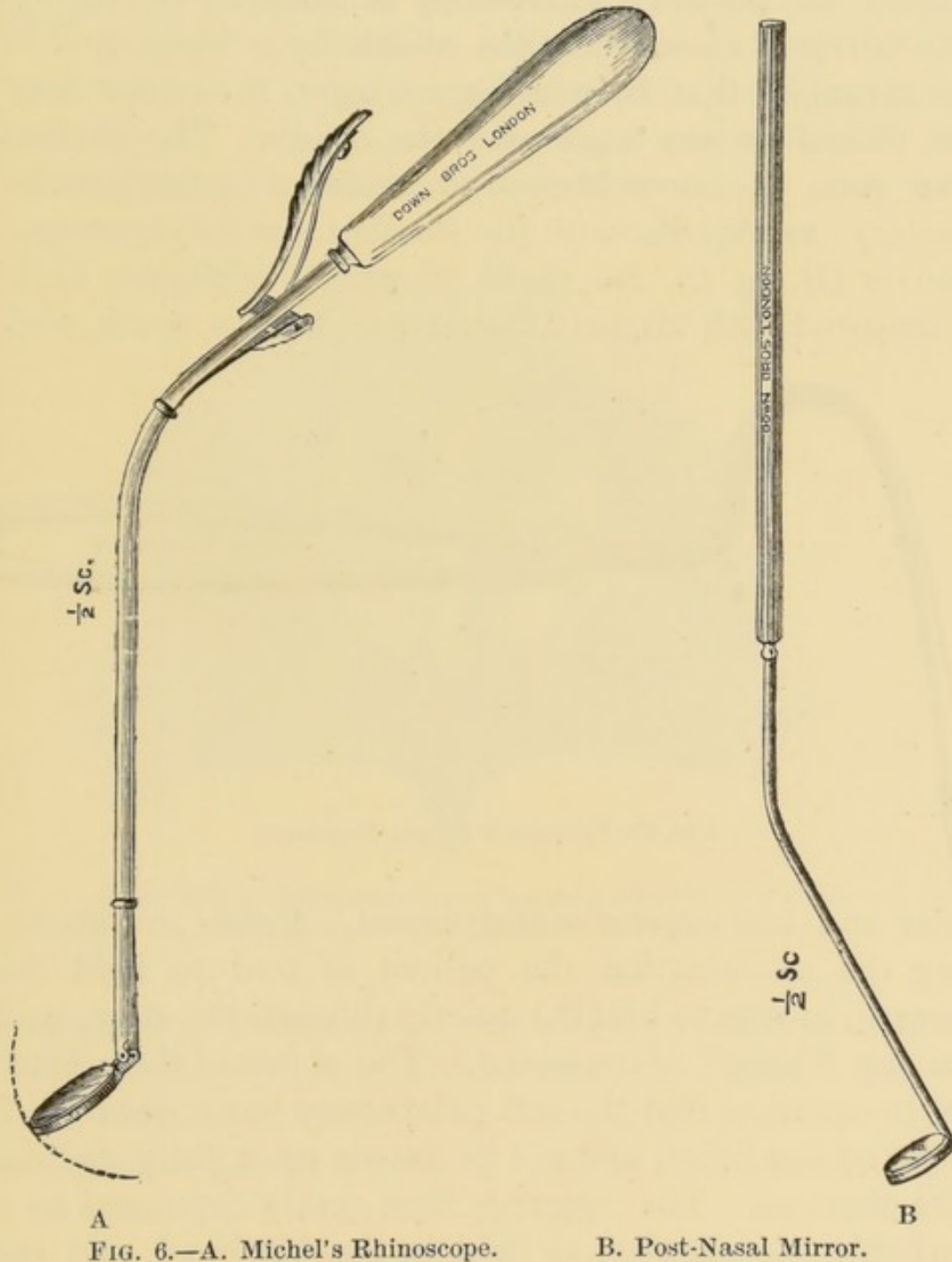


FIG. 5.—Outer Wall of Right Nasal Fossa, showing superior, middle and inferior turbinals, the frontal and sphenoidal sinuses, and the naso-pharyngeal orifice of the right Eustachian tube. (From de Schweinitz and Randall, "Diseases of Ear, Nose and Throat," vol. ii. Philadelphia, Saunders; London, Rebman, Ltd.)

This is fortunately extremely rare, as it offers a complete bar to posterior rhinoscopy. The second difficulty is of frequent occurrence. It consists in a broad and



A
FIG. 6.—A. Michel's Rhinoscope.

B. Post-Nasal Mirror.

deep soft palate and a co-existing long uvula, with a short distance between them and the posterior pharyngeal wall. The remaining difficulty is that which is

produced by instinctive drawing backwards and upwards of the soft palate, which follows upon the opening of the mouth and introduction of the mirror. The best mirror for posterior rhinoscopy is Michel's (A, fig. 6); the mirror is attached to the shank by a hinge, and is so arranged that, by pressing a trigger, the mirror may be placed at any angle with the shank. The student can soon accustom himself to making a perfectly satisfactory examination with the smallest size laryngoscopic mirror (B, fig. 6), the shank of which is slightly bent. Compared with Michel's instrument it is a much sim-

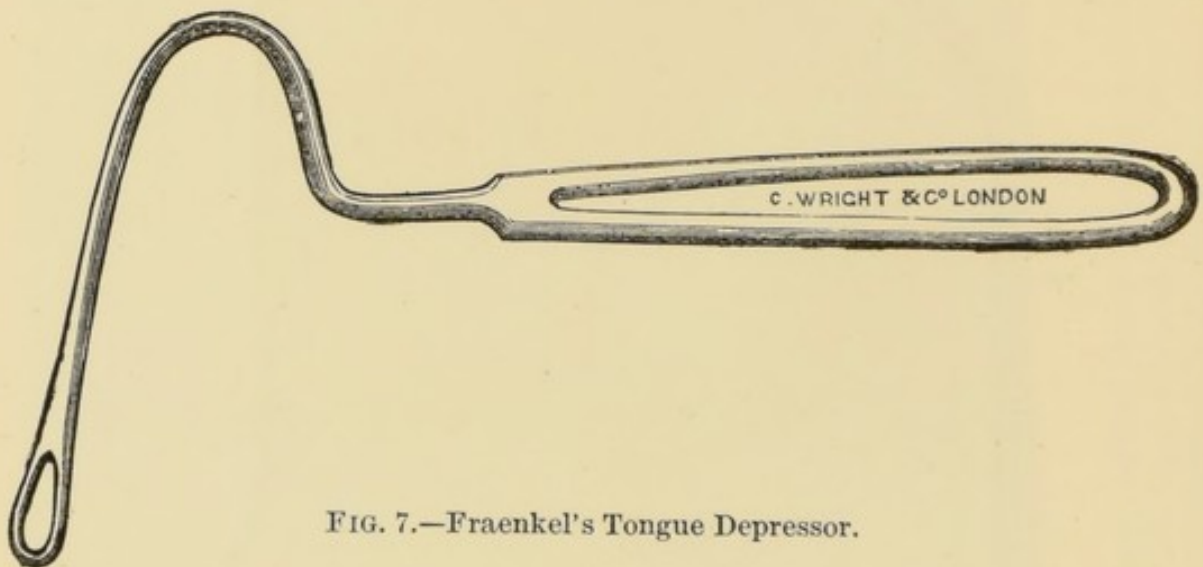


FIG. 7.—Fraenkel's Tongue Depressor.

pler and less expensive instrument. Before commencing the examination the patient is told to hold the breath, or else to breathe quietly through the nose, and to say "hang" if requested. The object of this advice is to arrange that the soft palate may hang down in a relaxed condition, and not be drawn up tightly against the pharynx. The tongue is then gently depressed by a suitable spatula (fig. 7) held in the left hand, and the rhinoscopic mirror, well warmed, is introduced behind the soft palate, on one side or the other of the uvula. When it is in position, the trigger is pressed so as to

elevate the mirror, and by this means a view of the posterior nares may be obtained. Should the soft palate be very irritable, both it and the pharynx and tongue may be sprayed with a 10 per cent. solution of cocaine. This procedure will often enable a satisfactory view to be obtained. Various hooks (*e.g.*, White's self-retaining palate hook) and snares have been recommended for pulling the soft palate forward; but men of great ex-

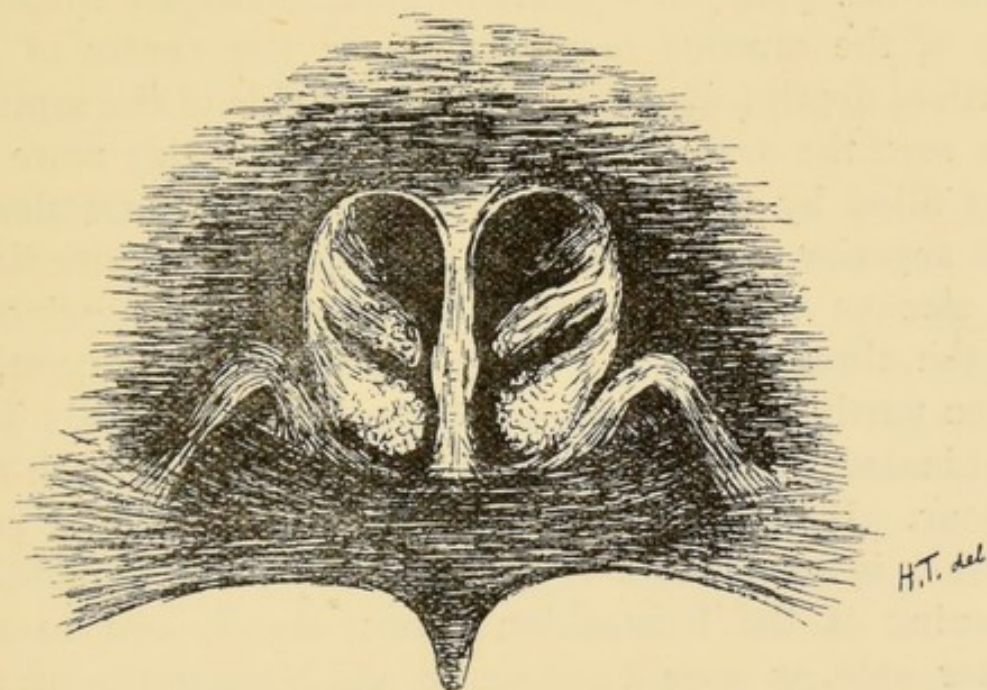


FIG. 8.—View obtained by posterior rhinoscopy showing the three turbinal bodies and meati with openings of Eustachian tube.

perience in this method of examination, rarely use them and we hold that cases necessitating instrumental assistance decrease rapidly with increased experience and manipulative dexterity on the part of the physician.

It must be borne in mind that, on account of the smallness of the mirror and the anatomical arrangement of the parts, it is impossible to get a complete picture of the posterior nares at any one moment; only segments of the picture can be obtained. In

making a rhinoscopic examination, the first things that come into view are the posterior aspect of the uvula and the posterior surface of the velum palati. By gently raising the mirror the septum should be seen. It appears as a pale red, at times almost white, ridge in the middle line, narrow below, but expanding above and becoming of a deeper red colour. Though the posterior edge of the septum is generally narrow, yet it sometimes presents a bilateral spindle-shaped thickening of the mucous membrane near the centre of its vertical depth (*vide* fig. 8). On either side of the septum are seen the oval nasal fossæ, the spaces being more or less filled by the three turbinated bodies. Of these, the superior is the smallest; the middle is intermediate in size as well as situation, but is seen most distinctly of the three; and the inferior, which is the largest, is often partly hidden from sight by the soft palate. The turbinated bodies are usually of a grey or greyish-red colour. If the mirror be now rotated externally, a projection is seen, beyond which is the pale, funnel-like opening of the Eustachian tube; above, and to the outer side, is seen a groove, to which the name of the fossa of Rosenmüller has been applied. If the mirror be directed upwards, the vault of the pharynx can be inspected. The appearances to be seen here vary greatly. If the patient be young, and adenoid vegetations be present, nothing but a pale red, irregular mass is to be recognised; if, on the other hand, an adult without any enlargement of the pharyngeal tonsil be examined, the vaulted appearance of the naso-pharynx can be distinguished.

It will well repay the student to perfect himself in the art of posterior rhinoscopy. One of us (H. T.) has seen a tertiary syphilitic ulcer located on the upper surface

of the soft palate and resisting all sorts of empirical treatment until its presence was discovered by posterior rhinoscopy. Similarly diphtheritic membrane may be visible in the post-nasal space alone, before its presence elsewhere accounts for what may be alarming constitutional symptoms, whilst adenoid growths may often be detected without putting the patient to the discomfort of examining the post-nasal space with the index finger.

Local Anæsthetic Agents.

Cocaine.—Solutions of this drug are so constantly used in the treatment of diseases of the nose and throat and are occasionally followed by toxic symptoms in susceptible individuals, that we think it wise to say a few words about the general use and action of the drug.

Its application to a mucous surface produces anæsthesia with contraction and artificial ischæmia of the parts, the latter property being often of the greatest value in the examination of the nasal cavities.

Five to twenty per cent. solutions of the drug are those most commonly employed. The former strength is useful for purposes of examination, but where operation is contemplated a solution from ten to twenty per cent. will generally be necessary. The addition of half as much resorcin as cocaine will increase the local action, diminish the toxic effect, and prevent the cocaine crystallizing out.

Applications to mucous surfaces may be made by means of a spray (fig. 9) or by a dossil of cotton wool dipped in the solution. As a general rule we advise the latter method, because it is easier in this way to gauge the amount of the drug used, and to apply it to the

actual surface to be operated upon. To assist in making a complete rhinoscopic examination a fine spray of a five per cent. solution, one squeeze of the ball to each nostril, is usually without any danger. A ten to fifteen per cent. solution applied to a mucous surface renders it sufficiently anæsthetic for operative interference in about five minutes. Reactionary hæmorrhage

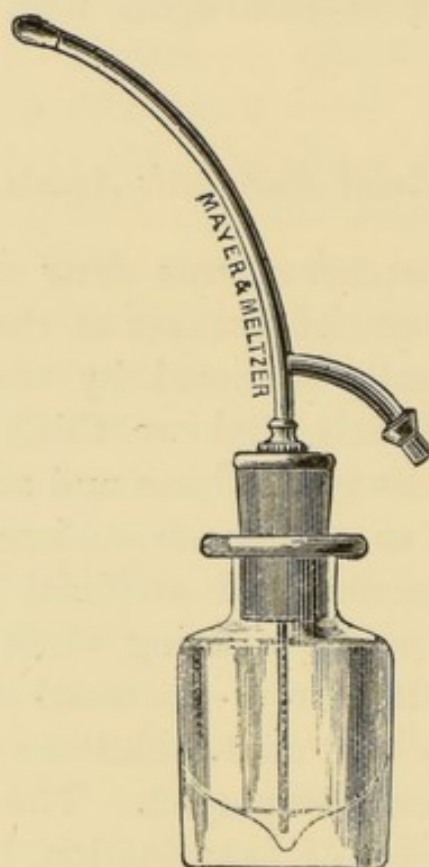


FIG. 9.—Cocaine Spray.

may follow within an hour of an almost bloodless operation, when the contraction of the blood vessels induced by the cocaine has passed off. Some people, otherwise healthy, are peculiarly susceptible to the toxic action of the drug, even when used in small doses. Consequently a new patient should always be cautiously proceeded with in the matter of cocaine. Submucous injections are far more dangerous than surface applications, but

they are rarely used in rhinolaryngeal surgery. Children are very tolerant of the drug.

Toxic Symptoms.—Under a relatively excessive dose the patient complains of feeling faint and giddy with a “tingling feeling” in the hands and feet. He is pale and perhaps breaks out into a sweat. Palpitation, præcordial anxiety, rapid pulse, nervous agitation, rapid respiration, dilated pupils are additional symptoms which, in graver cases, may pass on to prostration, delirium, severe cramps of the flexor muscles of the limbs, cyanosis and convulsions.

Treatment.—The patient should lie down, and brandy, ammonia, black coffee, &c., be administered by mouth, or even by the rectum in some cases, and subcutaneous injection of strychnine given. If much cocaine has been swallowed the stomach should be emptied by a mustard and water emetic, if a stomach-tube is not at hand.

Eucaine.—This synthetic cocaine possesses certain advantages over the natural alkaloid, the chief one being the almost total absence of toxic properties whereas its anæsthetic action is said by those who frequently use it to be equal to that of ordinary cocaine.

Its disadvantages are that it produces less contraction than natural cocaine and that it takes longer (ten to fifteen minutes) to efficiently anæsthetise the part to which it is applied.

There is less likelihood of reactionary hæmorrhage after the use of eucaine than in the case of cocaine.

The strength of solution used is from five to ten per cent. Some authorities speak highly of a mixture of eucaine and cocaine solutions as possessing all the advantages and none of the disadvantages of either drug when used singly.

2. ACUTE RHINITIS.

Acute Nasal Catarrh, Coryza.

Acute catarrhal inflammation of the mucous membrane of the nose; *i.e.*, an ordinary cold in the head.

Ætiology.—There seems to be an hereditary tendency to coryza, and there is also some evidence in favour of its contagiousness, but no specific micro-organism has yet been discovered. Even if such exist there is no doubt that predisposing causes play an important rôle in the production of a “cold.” Amongst these we may mention pathological condition of the nasal mucous membrane, *e.g.*, forms of hypertrophic rhinitis, polypi, septal spurs and crests, which produce marked obstruction to nasal respiration; nervous exhaustion, bodily fatigue, especially when this supervenes on free perspiration, sudden changes of temperature from cold to hot or vice versa, draughts of cold air blowing upon an over heated or perspiring skin, &c. It is difficult to understand how these conditions produce susceptibility to acute nasal catarrh, but light may possibly be thrown on the subject by the recent researches of Thomson and Hewlett, which go to show that under normal conditions the nasal mucous membrane and its secretion is inhibitory to the growth of micro-organisms, which only exist, if present at all, in very small numbers, *e.g.*, Fraenkel’s diplococcus, Friedlaender’s pneumococcus, streptococcus pyogenes aureus, staphylococcus aureus and albus. If on account of any of the predisposing causes mentioned such protective properties are weakened or annulled, it is possible that the specific organism of coryza may gain an entry into the system and produce character-

istic results. In a similar way we may perhaps regard the origin of those grave constitutional diseases which are said to follow in the wake of a "neglected cold."

Conditions somewhat similar to acute rhinitis may be induced by internal administration of iodide of potassium, whilst in neurotic subjects or people with hypersensitive nasal mucous membranes, the inhalation of certain kinds of dust or odours may produce violent attacks of acute rhinitis, which are sometimes associated with asthmatic symptoms and which will be dealt with later on.

Morbid Anatomy and Pathology.—There is hyperæmia of the mucous membrane of the nose, with increased cell-proliferation and secretion.

Symptoms.—The chilliness, headache, and feeling of stuffiness in the nose, followed by sneezing and discharge of a watery, irritating fluid from the nostrils, form such a common experience that it will be unnecessary to do more than refer to these symptoms. After 24 to 36 hours the watery fluid becomes muco-purulent, and finally ceases. Accompanying the local manifestations there are usually evidences of constitutional disturbance, such as slight pyrexia, loss of appetite, furred tongue, constipation and high-coloured urine.

In children, especially infants at the breast, acute rhinitis may be quite a serious affection. Owing to the nasal obstruction, cyanosis and other symptoms of impending suffocation may come on when the infant is placed on its back or given the breast.

Treatment.—This, to be of any avail, must be undertaken at the very commencement of the attack. The most successful plan is the administration of ten minims of tincture of opium added to formula No. 14, and given every six hours for four doses, the patient

meanwhile being kept in a room at a uniform temperature and on light diet. A popular and efficient remedy is ten grains of Dover's powder at night followed at once by a hot drink and five grains of quinine the following morning. When the acute symptoms are over, quinine may be given with advantage. One of us (F. de H. H.) can speak from personal experience of the utility of the carbolised smelling salts in warding off a threatened attack of coryza (see formula No. 73). If the cough, which often follows nasal catarrh is very harassing a half to one grain of codeia will often give relief.

Others discard internal remedies and use at short intervals a nebulised solution of menthol in liquid paraffin (grs. x.-xx. ad ℥j.). This is sprayed into the nasal cavities by means of an atomiser (fig. 16). More useful still is Cushmann's dry menthol inhaler, or tampons of menthol wool inserted in the nostrils.

Among vapour inhalations ℥ij. of spirits of camphor in a pint of nearly boiling water gives great relief when the vapour is inhaled through the nostrils. The mixture should be inhaled from a narrow necked jug. Having been a great personal sufferer from acute colds in the head I (H. T.) find nothing tends to reduce profuse secretion so effectively as abstention from fluids for ten or twelve hours during the acute stage of the catarrh. In infantile coryza, Sajous recommends that a small piece of rolled up blotting paper should be introduced into the nostrils to absorb the secretion. Liquid paraffin containing two per cent. of cocaine, applied to the nostrils with a paint-brush every three or four hours, will help to keep the infant comfortable.

Prophylaxis is an important matter for people subject to colds, and the authors, from personal experience,

can speak of the great value of treatment directed to the relief of pathological intranasal defects, especially that of hypertrophic rhinitis in its different forms (*vide infra*). In milder cases the daily irrigation of the nasal cavities with a simple alkaline lotion will do much to induce a healthy and less susceptible condition of their mucous membrane. Those who are particularly liable to attacks of acute rhinitis, ought to regulate their mode of living so as to bring it more in accord with the rules of health. The most fertile cause of nasal catarrh is "coddling." People who shut themselves up in warm rooms, and who wear too much clothing when they go out, render their skins so sensitive to changes of temperature that the slightest draught upsets their heat-regulating centre, and a chill is the result. This is a probable sequence, because owing to their being over clad, any exertion will cause them to perspire, and, as is well known, people who perspire easily are more liable to colds than others. The most potent means of bracing the skin so as to enable it to accommodate itself to changes of temperature is undoubtedly the cold morning bath. The temperature of this must of course be regulated in accordance with the age and general vitality of the patient. If a bath at the temperature of the external air is followed by white fingers, headache or a sense of chilliness lasting a considerable time, then the temperature of the water must be raised until the bath can be taken without such after effects. For the more robust, water at the temperature of the external air may be used for the greater part of the year. In whatever way the cold water is applied, the great secret of success is vigorous friction of the skin afterwards, so that "reaction" may be developed. To those who can afford the time, the

Turkish bath is an excellent plan of accustoming the skin to resist sudden changes of temperature. Clothing should be light, and that worn next to the skin should be woollen or silk. Waterproofed and other impervious articles are not to be recommended to those subject to catarrh. Wraps round the neck are to be deprecated. On the other hand, I (F. de H. H.) have seen much benefit result to men from giving up shaving, and allowing the beard and whiskers to grow.

In connection with clothing must be considered the bed and its covering. Fortunately, spring mattresses have nearly universally superseded the old-fashioned feather bed, much to the advantage of the sleeper. The covering should be warm but light, and air-tight counterpanes discarded.

Diet also has an influence in the production of catarrh. Over-eating predisposes to catching cold, and there are certain articles of food which act injuriously—*i.e.*, pastry, sugar, and sweet things generally. Whether they act by disturbing the digestion, or whether they have any specific action, we do not pretend to say; but it is certain that benefit results from regulating the diet.

If the individual is anæmic, iron, arsenic, or cod-liver oil will be of use, the last being especially serviceable.

Constipation and any other condition of defective health should receive appropriate treatment.

3. PURULENT RHINITIS.

An inflammatory condition of the nasal mucous membrane, attended with a purulent secretion.

Ætiology.—The newly-born occasionally become

infected with purulent rhinitis from a gonorrhœal or leucorrhœal discharge in the mother. Adults suffering from gonorrhœa may infect themselves or others. A muco-purulent nasal discharge in children is one of the commonest evidences of post-nasal adenoid growths. A puriform discharge from the nose may be met with in the exanthemata and glanders. Syphilis, tuberculosis, certain forms of hypertrophic rhinitis (*vide infra*), fibrinous rhinitis, and the presence of foreign bodies may also give rise to a puriform discharge, but in the latter case the discharge is nearly always unilateral.

Bosworth lays great stress on the purulent rhinitis of childhood, as he maintains that it is the precursor of atrophic rhinitis. He regards it as a purely local condition, and not dependent on a constitutional dyscrasia. We have met with many cases of purulent and muco-purulent nasal discharge in children, but if from these we subtract those cases due to post-nasal growths and those accompanying other evidences of a strumous condition, we think very few, if any, would remain as indicative of the early stage of atrophic rhinitis.

Morbid Anatomy and Pathology.—There is hyperæmia of the nasal mucous membrane. At first the secretion is mucous, it soon becomes muco-purulent, and from the rapid cell proliferation it becomes puriform, and no longer yields mucin. According to Bosworth, in the final stage there is atrophy of the mucous membrane.

Symptoms.—In infants, as already mentioned (see p. 13), the disease, by leading to nasal stenosis, may give rise to grave symptoms. In children and adults the yellowish purulent discharge is the characteristic symptom, and is often associated with a lack of resonance

in the voice characteristic of nasal or post-nasal obstruction.

Diagnosis.—If care be paid in investigating the mode of onset there need be but little difficulty in arriving at a correct diagnosis as to the cause of the discharge. In the case of infants careful inquiry as to syphilis in the parents should always be made, because a purulent nasal discharge ("snuffles") is one of the commonest and earliest symptoms of the constitutional taint (*vide infra*). In older children a rhinoscopic examination will enable the observer to exclude such conditions as rhinoliths, foreign bodies and syphilitic necrosis, while digital examination of the post-nasal space will reveal the presence or absence of adenoid growths. (For diagnosis from empyema of antrum, see "Abscess of Antrum").

Prognosis.—This of course depends upon the cause and the efficiency with which the patient is treated both constitutionally and locally if necessary.

Treatment.—As already stated there is usually some definite cause for purulent rhinitis, and the treatment will vary in accordance with the former and will be discussed under its appropriate headings. We may state, however, that careful systematic cleansing of the nasal cavities is of importance in all forms of purulent rhinitis.

4. RHINITIS DUE TO SPECIFIC INFECTIOUS DISEASES.

In severe forms of *scarlet fever* the nostrils may be affected by extension from the pharynx. An acrid muco-purulent discharge flows from the nose, and excoriates the upper lip. In some cases, the mucous

membrane may slough in places, and even necrosis of bone or cartilage has occurred.

In *measles*, nasal catarrh is a prominent symptom from the very first, but it rarely gives rise to more than passing trouble.

The eruption of *small-pox* occasionally appears on the mucous membrane of the nose.

The nasal variety of *diphtheria* is described in Part II.

Affection of the nasal mucous membrane is one of the characteristic symptoms of *glanders*. The nose is not necessarily attacked at the commencement, as in some cases the nasal mucous membrane is only involved towards the end of the disease, and may sometimes escape altogether. At first a thin mucus is secreted, this becomes streaked with blood, and later on purulent and very offensive. There is great swelling of the nasal mucous membrane, and a similar condition of the membrane lining the antral and frontal sinuses. The nose may become blocked with crusts, swollen, and very painful. Tubercle-like nodules form, and may lead to ulceration of the mucous membrane and necrosis of the septum.

Treatment.—The essential local treatment of these nasal affections is the thorough cleansing of the passages; hence, in the above-mentioned diseases, if the discharge is offensive, various antiseptic sprays (formulæ Nos. 50 to 53) should be used at frequent intervals for this purpose, and in the manner shortly to be detailed. It may be noted, however, that the surgeon should be exceedingly careful in irrigating, douching or spraying the nostrils to use no force, or the infectious discharge may be driven into the middle ear and produce complications not only serious to hearing but even to life itself.

5. CHRONIC HYPERTROPHIC RHINITIS.

A chronic inflammatory condition of the nasal mucous membrane attended with a hyperplasia of the soft tissues and occasionally of the bony structure of the turbinal bodies.

Ætiology.—Although strumous, gouty, and ill-nourished individuals are often sufferers from this condition, still the most potent cause of hypertrophic rhinitis is, undoubtedly, the hyperæmia brought about by repeated attacks of acute rhinitis. At first, the mucous membrane returns to its normal condition after the attack, but as the attacks increase in frequency the mucous membrane becomes permanently swollen. This change is particularly liable to occur if there be already any abnormality of the nose, *e.g.*, deflected septum, spurs, &c., interfering with free nasal respiration. Persons exposed to sudden changes of temperature, to dust and irritant vapours, or to a constant discharge of pus from one of the nasal accessory cavities, frequently suffer from chronic rhinitis. As in the case of enlarged tonsils and adenoid vegetations, so in hypertrophic rhinitis there seems to be an hereditary tendency, and these conditions are not uncommonly found associated.

Morbid Anatomy and Pathology.—There is a proliferation of all the tissues of the mucous membrane but generally there is a preponderating hypertrophy of one or more of its elements, lymphoid, mucoid, glandular or vascular. In the simpler and more common cases where the interstitial tissue is mainly affected by a mucoid degeneration (Wingrave) the hypertrophy is more general and uniform, the mucous membrane being smooth as in normal conditions.

When, however, the muscular element surrounding the venous sinuses of the erectile tissue undergoes a similar degeneration, a chronic vascular distension is produced, which may be so localised that distinct growths are found, and as their surface somewhat resembles that of a mulberry, they are called "moriform hypertrophies." These are most frequently found on the posterior extremities of the inferior turbinals, they are less common anteriorly, whilst occasionally a fringe of this same papillary hyperplasia may occupy the whole lower border of the bone, and develop to such an extent that the excess of tissues lies packed away in the concavity of the inferior turbinate, from whence it can easily be dislodged by a probe.

Similar hypertrophic processes may be found in very chronic cases affecting the mucous membrane of the floor of the nose and parts of the septum, especially opposite the anterior portion of the middle turbinate.

The mucous membrane covering the middle turbinal is generally affected in a minor degree, and anteriorly the hypertrophied tissue tends to become polypoid and oedematous so that it may closely resemble an ordinary mucous polypus.

It must not be forgotten that the bony turbinals themselves enlarge in this condition, the middle bone often swelling so much anteriorly as to form a considerable obstruction to free nasal respiration (*vide* Nasal Stenosis).

Symptoms.—The chief complaints are referable to the obstruction of the nose and the increased secretion. The patients complain of a feeling of stuffiness in the nose they sniffle or frequently blow the nose, and there is a watery or muco-purulent secretion which leads to constant hawking and post-nasal irritation.

Owing to the nasal stenosis there is mouth breathing with its attendant evils whilst a loss of resonance in the voice is common. If the middle turbinal be much swollen, smell and taste may be interfered with. Impairment of hearing is frequently present, due to catarrhal swelling of the Eustachian tube or occlusion of its pharyngeal orifice by a moriform hypertrophy. Sneezing is a very common symptom, and is often the one which leads the patient to seek advice. If the turbinated bodies are so swollen that they touch or press upon the septum, various other reflex symptoms may exist, *e.g.*, supra-orbital neuralgia, aching or numbness over bridge of the nose, some frontal headache, &c. Fulness in the head, tinnitus, conjunctivitis and other ocular troubles are not infrequently found in patients suffering from this disease, and may be cured by its removal, whilst undoubtedly hypertrophic rhinitis is the commonest pathological factor in certain of the reflex neuroses, such as hay fever and asthma (*vide infra*). At night, the symptoms of stenosis are usually aggravated. On whichever side the patient lies, the corresponding nostril becomes completely occluded. This has generally been regarded as being due simply to gravitation of blood.

Acne rosacea has been noticed occurring in connection with chronic rhinitis, and disappearing when the nasal cavities received appropriate treatment. Simple hyperæmia of the nose may also be caused by pressure of the middle turbinate against the septum obstructing the return of the venous blood.

Diagnosis.—Chronic hypertrophic rhinitis requires to be differentiated from vaso-motor rhinitis, and from new growths, benign and malignant. Cocaine applied locally rapidly reduces the swelling in cases of vaso-

motor rhinitis, but has comparatively slight effect in the hypertrophic forms. New growths are usually more or less pedunculated, and even when this is not the case the growth is generally localised. Cartilaginous and bony tumours can be distinguished by their hardness.

Prognosis.—Under the methods of treatment formerly in vogue, chronic hypertrophic rhinitis was a most intractable disease, but the judicious local employment of the cautery or other caustics usually effects a marked improvement in all the symptoms, and sometimes a cure. Here we would take the opportunity of warning against a too active intra-nasal treatment. It is sometimes remarkable to notice the great benefit which results from a very slight cauterisation, though even the galvano-cautery is not altogether free from risk.

Treatment.—The first thing to be done is to carry out the general line of treatment as indicated under the head of Acute Rhinitis.

Locally much good may be effected by the use of medicated sprays (fig. 10). In simple cases an alkaline spray, such as No. 50 or 51 may be employed.

If, after the thick mucus has been removed by the action of these cleansing sprays, it is found that a profuse secretion continues, various mild astringents, such as formulæ Nos. 56, 57, 66, and 67, may be tried. Generally speaking we should say that, in mild cases, if a simple alkaline wash used morning and evening does not produce the desired relief, more active measures should be at once taken, for nothing tends to centre a patient's mind upon his nasal complaint so much as the constant application of snuffs and drugs exercising well marked temporary effects, as cocaine,

menthol, eucalyptol, thymol, &c. Powders we have not found of use in hypertrophic rhinitis. Should the mucous membrane be much thickened, and especially if there be outgrowths on the anterior or posterior extremities of the inferior turbinals, more active treatment *must be* undertaken. Where there is simply a general swelling of the mucous membrane excellent results usually

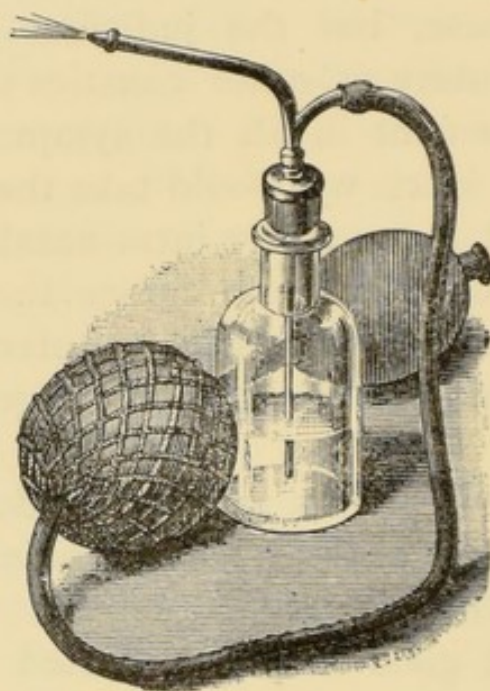


FIG. 10.—Hand-ball Spray Apparatus.

accrue from scoring it with the flat blade of the galvano-cautery (fig. 11), after the previous application of cocaine.

Another method is to pass the fine pointed cautery at a bright red heat deeply into the hypertrophied tissues close to their attachment to the bone, hold it there for three or four seconds and then withdraw it. An internal slough is produced, and when the inflammatory process has subsided and internal cicatrization has occurred, the hypertrophy is much diminished and the mucous membrane remains intact. A fine tenotomy

knife can be similarly used to divide the submucous tissues and large blood vessels, and one of us (H. T.) has found this method, introduced by Delavan, give excellent results.

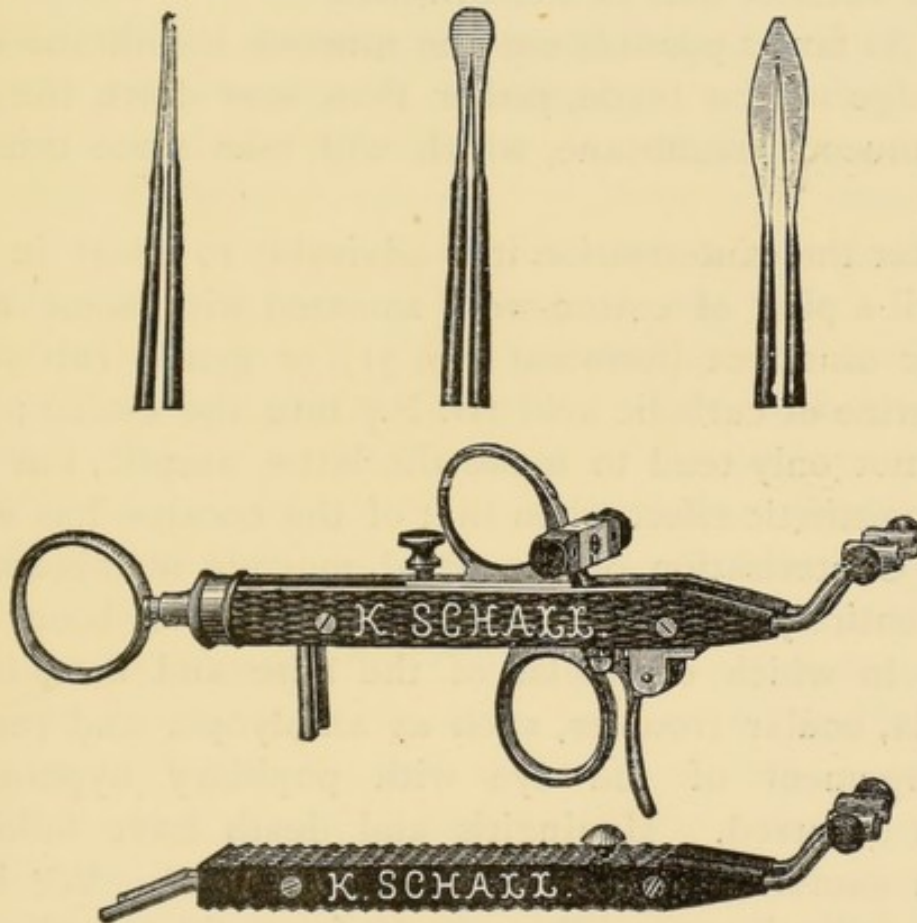


FIG. 11.—Schech's Galvano-Cautery Handles and Burners.

The inexperienced should bear in mind the following rules with regard to the use of the galvano-cautery.

1. Cleanse the nostrils before the cautery (or cocaine) is applied.
2. See that the blade of the instrument is scrupulously clean.
3. The blade of the cautery point should be used at a bright red heat.
4. Never use the cautery where you cannot watch its action.

5. Be careful not to touch the septum and its opposing region of turbinal, or a cicatricial bridge will probably form and destroy any benefit otherwise derived.

6. As a general rule confine the action of the cautery to the anterior half of the turbinal.

7. As far as possible cut the mucous membrane with the edge of the blade, rather than sear down the surface mucous membrane, which will take some time to heal.

After the cauterisation it is advisable to insert in the nostril a plug of cotton-wool smeared with some antiseptic ointment (formulæ No. 31), or gently rub some glycerine of carbolic acid (B. P.) into the eschar; this will not only tend to make the latter aseptic, but has an anæsthetic effect when that of the cocaine has worn off. Cauterisation of the nasal mucous membrane is not entirely free from risk. Cases have been met with in which erysipelas of the nose and face, otitis media, ocular troubles, such as amblyopia and venous engorgement of the eye with pupillary hyperæmia have occurred. Meningitis and death have followed upon cauterisation of the middle turbinal. We have seen follicular tonsillitis result from this method of treatment, and one of us (H. T.) suffered from a severe attack of tonsillitis (quinsy) which supervened on the same side as the turbinal to which the galvano-cautery had been applied, within twelve hours of cauterisation. In two instances, within a week after cauterisation for hypertrophic rhinitis, patients of mine (F. de H. H.) contracted scarlet fever. Is it possible that the raw surface left by the cautery afforded entrance to the scarlet fever bacillus? At the periods in question—the cases were separated by more than a year—I had no scarlet fever under observation, so I do

not think that I could have been the means of conveying the infection.

Heryng advocates the use of chromic acid in preference to the galvano-cautery. He maintains that it is less painful, and has a more immediate as well as a more powerful effect in causing contraction of the swollen mucous membrane. If precautions are taken, the serious consequences following its use, such as severe vomiting, diarrhoea, collapse, and even fatal poisoning of a choleric form type, which have been reported, can be altogether avoided. He recommends that a small crystal of the acid should be gradually and carefully warmed on a suitable silver probe. The acid forms a brownish-red coating to the probe, which adheres firmly and will not crumble off. If too great a heat be employed, the red coating becomes converted into a blackish-grey, porous layer consisting of chromic oxide which has no caustic properties. The mucous membrane of the nose, previously cocaineised, can be lightly touched with the probe thus charged, and, if deep cauterisation be required, pressure can be maintained for a few seconds. It is advisable to cleanse the nose with a spray of warm boric acid solution before the acid is used, and afterwards to spray the part with an alkaline solution (Nos. 50 and 51), so as to neutralise any excess of acid; or the cauterised spot may be swabbed with a pledget of cotton-wool soaked in a solution of bicarbonate of sodium. The nostril operated on should be protected from the cold air and dust by a pledget of cotton-wool smeared with an antiseptic ointment (No. 31, or Ung. Iodoformi, B. P.). Bosworth also strongly advocates chromic acid, and he very properly points out that its object is not to destroy a supposed fungous growth, but to pin down the hypertrophied tissue in such a way that

its plethoric circulation shall be controlled, and the excessive nutritive processes checked. Glacial acetic acid, which is a less powerful agent, may be employed in the same way. Whatever chemical caustic be employed, the precautions recommended in connection with the application of chromic acid, should be resorted to. Hollow vulcanite plugs and bougies, nasal intubation tubes, &c., have all been suggested for the treatment, auxillary or otherwise, of hypertrophic rhinitis; but, as a rule, patients find such contrivances extremely irritating and accompanied by so little relief that they quickly discard them.

In cases in which the hypertrophy amounts to a polypoidal condition of the so-called moriform type, the surplus tissue must be removed by means of a wire snare. Whilst the galvano-caustic loop was formerly in most frequent use, its place has now been largely taken by the cold wire snare used in one of the various nasal snares, a fact which may be accounted for by their greater convenience and portability and the perfection of mechanism to which these instruments have been brought. Of the many snares which have been invented MacDonald's instrument will be found to meet all needs, it can be manipulated with one hand the other being free to hold the speculum or adjust the snare with the forefinger in the naso-pharynx (*vide infra*).

The above mentioned and most of the modern snares are so constructed that the operator's hand, whilst holding the instrument, is below the line of vision. The wire loop of the snare is passed over the enlargement and tightened up by a screw action until the growth is cut off. The slower this process takes, from five to twenty minutes, the less likelihood of hæmorrhage following it. Some glycerine of carbolic acid may then

be applied to the raw surface and a packing of iodoform gauze placed between it and the septum in order to check hæmorrhage should it occur. The dressing must be removed in forty-eight hours time and the nostril cleansed with a warm alkaline antiseptic wash. It will not be necessary to replace the dressing. When the growth springs from the posterior extremity it is gener-

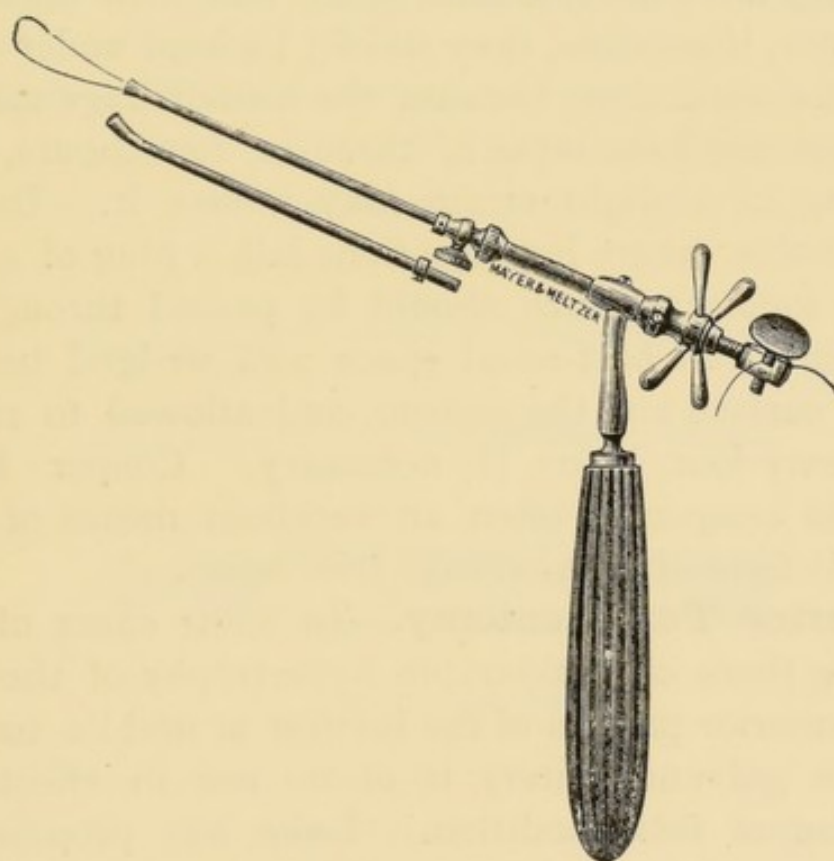


FIG. 12.—MacDonald's Snare.

ally best to insert the left index finger in the nasopharynx (for either side), and having passed the loop of the snare through the nostril with the right hand, it (the loop) will be manipulated over the growth and held there for a moment by the left index finger whilst the snare is tightened up. The left hand is at once removed from the patient's mouth and the snare screwed up till the growth is removed. Only when the nostril is very

patent is it possible to engage the growth in the loop by anterior rhinoscopy.

If the hæmorrhage be profuse, as occasionally happens, the injection of hot water with equal parts of Hazeline will generally suffice to check it. In rare instances, anterior or even posterior plugging may be necessary (see "Epistaxis"). We have known patients bleed until they have become faint after this little operation, and hence, if possible, they should be kept under observation for some time, because the hæmorrhage may not supervene until the lapse of three or four hours, when coughing or a slight strain may induce it. In such cases as this, where hot injections fail, a plug of aseptic wool or iodoform gauze should be passed through the mouth into the post-nasal space and wedged between the cut surface and the septum, and allowed to remain for twenty-four hours if necessary. Cooper Rose's epistaxis tampon is often an excellent means of stopping this form of hæmorrhage (*vide infra*).

Anterior Turbinectomy.—In some cases of long standing there is considerable hypertrophy of the bone of the anterior portion of the inferior or middle turbinal and the galvano-cautery is of no use in effecting a reduction of this condition. Lake has proposed an excellent method of dealing with such cases which he has termed "anterior turbinectomy." The anterior quarter of the inferior turbinal is cocainised on its inner and outer aspects. Its bony attachment to the outer wall of the nose is next divided from before backwards by a pair of curved scissors, and a cold wire loop is then passed over the semi-detached portion, which is easily removed by tightening up the snare. The effect of this procedure is to provide a *double air way* in the respiratory passage and the relief obtained is very marked.

The parts should be packed with iodoform gauze for forty-eight hours to check hæmorrhage (which is rarely serious) and to protect the raw surface. I (H. T.) have performed this operation in some sixty-five cases and found it give excellent results, and have never seen any evil consequences following its adoption, a testimony which cannot be accorded the complete turbinectomy formerly so much in vogue and still practised by a few.

Complete Turbinectomy.—This consists in practically a complete removal of the whole inferior turbinal. Under general anæsthesia or even after the parts have

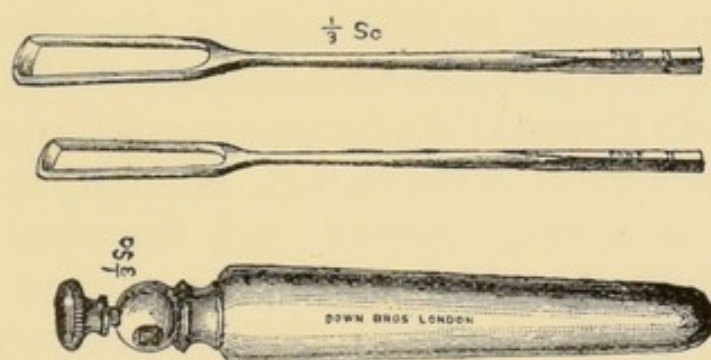


FIG. 13.—Turbinotome.

been numbed by cocaine, the index finger of the surgeon is passed into the naso-pharynx and the loop of the turbinotome "drawknife" or "spokeshave" (fig. 13) is passed through the nostril and guided over the posterior extremity of the turbinal so that the sharpened edge is in contact with the posterior extremity of the bone. By a firm, rapid withdrawal of the instrument practically the whole of the inferior turbinal is removed.

It need scarcely be said that the patient's nasal respiration is usually free after this operation but the abolition of so much physiological mucous membrane has in some cases terminated in a dry form of pharyn-

gitis and laryngitis, which has been a greater evil than the nasal obstruction for which the operation was performed. Brisk reactionary or even secondary hæmorrhage has been a not uncommon complication, and of such severity as to be a source of extreme anxiety to the surgeon and the patient's friends. Such a radical and extreme measure as complete turbinectomy must be very rarely necessary and has almost passed out of use since the advent of anterior turbinectomy, which has all the advantages and none of the drawbacks of the more serious operation.

When the middle turbinal is enlarged, it is, as a rule, only necessary to remove the anterior half. The operation is very similar to that already described for the lower bone. Its junction with the outer wall is snipped through with Gruenwald's forceps or cut through with a pair of intra-nasal scissors, *e.g.*, Walsham's, and the wire loop of a snare passed over the semi-detached portion, which should be cut through without any traction upon it. The latter caution is necessary because of the important relations of the middle turbinal with the cribriform plate of the ethmoid.

6. RHINITIS SICCA.

This term has been applied by MacDonald to a form of chronic rhinitis, in which, although the tissues are turgescent, there is a deficiency or inspissation of the secretion. It is found in gouty plethoric individuals of middle age and in anæmic females who live in dusty or ill-ventilated surroundings. An alcoholic tendency is often a feature in these cases. The nasal mucous membrane is red, dry and glazed, while there is often a

tendency to non-foetid crust formation on the septum or middle turbinal. Similar conditions may be found in the naso-pharynx, pharynx and larynx. The symptoms complained of are a difficulty in dislodging the secretions from the naso-pharynx, the dryness of the throat, various degrees of hoarseness and occasional ear troubles.

Treatment.—Constitutional measures are of first importance and do not need specification. The local treatment consists of anterior or posterior warm alkaline nasal douches to remove the inspissated secretions. Watson Williams recommends a nasal snuff as the condition improves (formula 75).

For the dry pharynx we recommend gargling with salt water every morning, and the occasional use during the day of pastilles of borax, chlorate of potash, or cubebs. The laryngeal condition may be relieved (especially when irritated by particles of inspissated mucus) by warm alkaline sprays or injections (*vide* Chronic Laryngitis), or by inhalations of pine vapour (formula 71).

7. CHRONIC ATROPHIC RHINITIS.

Ozæna.

Chronic inflammation, followed by atrophy of the mucous membrane of the nose, accompanied by a mucopurulent discharge and the formation of dry crusts of a most offensive odour.

Ætiology.—Chronic atrophic rhinitis is distinctly a disease of early life. Zaufal even regards it as being due to a congenital defect of intranasal structures.

The malady, however, seldom appears in subjects under four or five years of age; towards puberty it increases in severity, and the majority of cases commence before the sixteenth year. Schech has seen only two cases which developed after the twentieth year, one in a highly chlorotic lady after the removal of numerous polypi which obstructed the nose, and the second in an elderly married woman much debilitated by a uterine disorder.

Sex seems to exercise considerable influence in the production of the disease, as females are more frequently attacked than males, in about the proportion of seven to two.

There is a divergence of opinion concerning the general health of the subjects of this disorder. Although cases may possibly occur in which the patient would seem to be quite well, yet most authorities agree that there is usually some defect of the general health, amongst the commonest being anæmia, chlorosis, or evidences of a strumous diathesis. The authors' experience would endorse such a view and we are inclined to believe that in anæmic young females there is a peculiar vulnerability of mucous membranes generally, their well-known liability to gastric ulcer being an example of this tendency. It is doubtful whether inherited syphilis acts as a predisposing cause of atrophic rhinitis. That there is an hereditary tendency to this condition is shown by the fact that atrophic rhinitis is frequently met with in more than one member of the same family.

Pathology.—The views held as to the pathology of this disease are almost as numerous as the modes of treatment suggested for its cure, and like the latter are none of them entirely satisfactory. Hence in a prac-

tical treatise such as this book is intended to be, we shall merely state a few of the more probable causes and leave their discussion to more comprehensive works on the subject.

Mackenzie, Fraenkel, and many others, believe that the condition is preceded by a chronic catarrhal process associated with hypertrophic changes; whilst others consider the atrophic condition may commence *de novo*, especially when a certain constitutional dyscrasia is well marked.

Michel and Gruenwald regard atrophic rhinitis as secondary to suppuration of one or more of the nasal accessory cavities, but some of the cases adduced in support of this view can scarcely be considered typical of the disease, and furthermore atrophic rhinitis often commences early in life before the accessory cavities have developed.

Bosworth maintains that ozæna is the final stage of purulent rhinitis of childhood. This condition tends to destroy the normal ciliated epithelium and glandular structures of the mucosa and to replace the former with squamous epithelium; hence the drying of the secretion, which is one of the main features of the disease. This last process is further accelerated by the congenital excessive "roominess" of the nasal cavities found in all cases of atrophic rhinitis. On the other hand, bacteriology has been laid under tribute in order to discover the specific organism of atrophic rhinitis, but without satisfactory results. Loewenberg has discovered a bacillus (*b. mucosus*) which is nearly always present in the diseased mucous membrane, but whether as cause or effect has not been determined. Hajek has isolated a bacillus (*b. fœtidus*) which in view of its power of decomposing organic substances and producing a penetrating stink,

may have something to do with the characteristic foul smell of ozæna. Cozzolino regards the atrophy of bone and mucosa as due to some primary nutritive change of the turbinated bodies, while the bacillus mucosus is, in his opinion, a secondary factor flourishing in a suitable medium and giving rise only to the fœtor and crusts. Other organisms present in the disease are the bacillus coli communis, bacillus Friedlaender, diplococcus pneumoniae and staphylococcus pyogenes aureus.

Krause lays great stress on the fatty degeneration which he found in the mucous membrane and gland epithelium, and he attributes the sickening and rancid smell to the fatty acids liberated on the decomposition of the fat globules.

In connection with the above mentioned conclusions it may be noted that Wingrave has drawn attention to the following pathological features characteristic of atrophic rhinitis:—(a) the ciliated is replaced by stratified epithelium; (b) the glands and venous sinuses are diminished and degenerated; (c) beneath the surface epithelium a stratum of round cells is seen more particularly located in the neighbourhood of the vessels and glands; amongst these cells certain highly refractive bodies of unknown nature are found; (d) the bone is passively atrophied but shows no evidence of active disease. He further points out how the brunt of the disease seems to fall upon the glandular tissues of the nose, naso-pharynx and pharynx, so that in a well marked case the absence of gland tissue in the latter situations gives the mucous membrane the appearance of being thinly stretched over the cervical vertebræ. Similarly it is uncommon to find faucial tonsils in association with the dry pharyngitis following upon atrophic rhinitis.

Symptoms.—From a consideration of the anatomical changes met with in the disease, it will be at once seen that the degenerate mucous membrane is no longer capable of secreting the bland, sero-mucous fluid which it is its function to furnish, but secretes instead a mucopurulent discharge which readily dries and forms the crusts. These are retained in the nasal passages and, undergoing decomposition, give rise to the excessively offensive odour whence the disease derives its synonym of ozæna. The odour is of a peculiar, sickening character, and when once it has been experienced it can readily be recognised again. Fortunately for patients the sense of smell is early lost in atrophic rhinitis, so that they are in happy ignorance of the disgusting smell emitted from the nostrils. At the menstrual periods there is generally a great increase in the severity of the symptoms, and cases which, under treatment, have become free for a time from smell, may again be offensive. After twenty, the odour usually lessens, and it may entirely disappear in old age.

In some cases of ozæna it will be found that the fœtor of the breath has a double source, *i.e.*, it proceeds both from the nostrils and also from the trachea. The tracheal condition is secondary to the rhinitis, but when once it has started it may continue independently. The diagnosis of tracheal ozæna rests on the expectoration of greenish, thick, viscous pellets, having the odour of ozæna, occurring especially in the morning; the persistence of fœtor of the breath after the nostrils have been thoroughly disinfected; and, finally, on the fact that the air exhaled by the mouth is as fœtid as that from the nostrils.

The dry condition of the nose in atrophic rhinitis causes it to be irritable, so that the patient is inclined

to pick or scratch the interior, and thus cause excoriation of the mucous membrane and slight hæmorrhage. Indeed, the constant introduction of the finger up the nostrils may give rise to a perforation in the septum, the tissues being already thinned by the disease itself. In consequence of the dilated and dry condition of the nasal passages, the inspired air does not get filtered, warmed, and moistened, so that pharyngeal, laryngeal, and bronchial catarrh are frequently met with in patients afflicted with the disease. Two of the most troublesome symptoms are the hacking cough produced by the dry condition of the pharynx, and the hawking induced by the patient's attempt to dislodge the dry crusts which adhere to the naso-pharynx.

Ear and eye troubles are frequently met with in cases of atrophic rhinitis. Among the former are to be mentioned acute and chronic catarrh of the middle ear and tinnitus; among the latter, ulcer of the cornea with hypopion and conjunctival catarrh. Many reflex symptoms also occur in the course of the disease, such as paræsthesiæ of the pharynx and larynx, headache, neuralgia, giddiness, &c. There is reason to believe that dyspeptic symptoms are sometimes due to ozæna; at all events we have seen great improvement in the digestive system after methodical treatment of the nose.

From constantly dwelling on the nasal trouble, patients sometimes become depressed in spirits, and melancholia has been occasionally observed as a consequence of the disease.

The appearance of a patient suffering from atrophic rhinitis is very suggestive, the nose being depressed at the bridge, giving rise to the condition termed saddle-back, and the tip turned up, showing the

nostrils, which are unusually dilated, and devoid of vibrissæ.

By anterior rhinoscopy in a typical case the nasal cavities will be seen filled with dry crusts, consisting of inspissated muco-pus, which are abominably offensive. When these have been removed, the cavity of the nose will be found greatly dilated, so that it may be possible to see the posterior wall of the pharynx. The mucous membrane is usually pale, but sometimes it is slightly reddened. Distinct ulceration may be said not to occur in this disease, though the detachment of the crusts may give rise to a little bleeding; there is frequently, however, on the middle turbinated body an excoriated patch. If the cartilages and bones are necrosed, the case can no longer be regarded as one of genuine atrophic rhinitis. The turbinated bones may be so atrophied as hardly to project into the cavity, or the turbinals on one side may be swollen and red, whilst on the other they are atrophied; or the anterior part of the inferior turbinal may be tumefied, and the posterior part atrophied, and vice versâ.

Posterior rhinoscopy reveals a similar condition of atrophy, and the posterior nares may be found occluded with dry crusts. The pharynx is dry and glistening, or covered with adherent mucus, which in towns is usually black from soot or other impurities in the air, which the capacious nostrils have failed to arrest. A dry, glazed state of the pharynx, or the presence of adherent mucus, should suggest the idea of atrophic rhinitis.

Diagnosis.—The diagnosis of atrophic rhinitis is seldom a matter of any difficulty; the characteristic stench emitted by the patient and the dilated nasal passages, occupied by dry crusts of mucus, are not present in other diseases. Suppuration in the antrum

might possibly be mistaken for atrophic rhinitis ; but in this condition the discharge is often confined to one nostril, is simply purulent and never dries to form crusts whilst it is commonly associated with polypi or granulations springing from the region of the middle meatus. Furthermore, as Heath has pointed out, in antral suppuration the offensive smell is perceived by the patient and not by his friends, the reverse being the case in atrophic rhinitis. Syphilitic disease of the nasal passages might be mistaken for atrophic rhinitis, but in this case the discharge has not the characteristic smell of the latter disease, and manifestly depends upon a definite ulceration of the mucous membrane and necrosis of the subjacent bone which are often limited to the nasal septum. Moreover, the ready manner in which the nasal syphilis usually yields to treatment will assist in arriving at a correct diagnosis in doubtful cases.

It is hardly necessary to give a warning against confounding the foetid discharge due to the presence of a foreign body in the nostril with atrophic rhinitis. I (F. de H. H.) have, however, seen a rhinolith, producing a foetid discharge, mistaken for ozæna. As it is often impossible to get any history of the introduction of a foreign body, the diagnosis must rest upon a careful rhinoscopic examination.

Prognosis.—Though atrophic rhinitis does not in any way threaten life, it may make it almost unendurable, and the characteristic smell may prevent the sufferer from being able to gain his livelihood on account of the nuisance he is to all around him. Most authorities agree that a cure is practically impossible when once the disease is definitely established. On the other hand few incurable maladies are capable of

such amelioration as atrophic rhinitis if it is methodically and carefully treated. Hence, we are in the habit of telling our patients that they must not expect an absolute cure, yet if they will only take the necessary trouble the disease will be robbed of its worst features. As already mentioned, the smell usually lessens after twenty, and may disappear entirely in old age.

Treatment.—Whatever view be taken as to the origin of chronic atrophic rhinitis, too much stress cannot be laid on the importance of prompt treatment of nasal affections in childhood, so as to prevent, if possible, the onset of the changes which give rise to this disease.

Though local treatment is all-important in atrophic rhinitis, it is well before commencing it to see if there be any underlying general condition of ill-health which needs correction. If anæmia be present, the combination of ammonio-citrate of iron with arsenical solution (formula No. 21), given thrice daily, exercises a beneficial effect. If there be any tendency to phthisis, cod-liver oil should be administered. The iodides do not seem to have any good effect in the ozæna due to atrophic rhinitis. Open air exercise and especially visits to the sea-side as often and for as long as possible are frequently fraught with benefit to the patient. It is said that the muddy seashores in the neighbourhood of the Bristol Channel (Burnham, Weston, Clevedon) where the tide recedes a long way possess special virtues for cases of atrophic rhinitis.

The essential point in the local treatment is the thorough cleansing of the nasal cavities.

This may be effected in three ways:—(1) by means of a douche; (2) by spraying; (3) by the use of the anterior and the posterior syringe. The douche is

undoubtedly the most effective of these methods, but some have discarded it in favour of the spray, because the former has the disadvantage that, unless used with care, fluid may be forced through the Eustachian tubes into the tympanum and set up acute otitis media. We have had no personal experience of this accident, but cases have been reported and are possibly due to ignorance on the part of the patient of the proper method of douching.

In douching or syringing the nostrils a patient should be instructed to keep the mouth widely open and to breathe quickly "backwards and forwards" while the fluid is injected into the nose. The solution will then pass up one nostril and out of the other with little probability of its going into the ear or throat. It is surprising how quickly, after a few trials, a patient can do this for himself, and the details of the method apply to all forms of nasal syringing or douching.

Whichever method is used, the following rules, modified from those laid down by Dessar, should be observed:—

1. The lotion should always be used lukewarm. Plain water should never be used in the nose because it loosens the nasal epithelium, an action which is prevented by the addition of a little sodium chloride.
2. After douching, the nostrils should be alternately stopped while air is forced down the free one in order to dislodge any crusts which have not been brought away by the lotion.
3. If one nostril is more obstructed than the other the douche should be applied to the obstructed side.
4. As a general rule a morning and evening douche is sufficient.
5. About half-a-pint of the lotion may be used for

each cleansing but less may be quite sufficient especially as the case improves.

Fig. 14 shows a 3 oz. rubber bottle with multiperforated teat which answers very well in these cases, and which the clumsiest of patients can use without diffi-



FIG. 14.—Nasal Syringe.

culty. Another excellent method is a Higginson's syringe fitted with a suitable nose-piece.

The anterior or posterior spray (fig. 15) answers fairly well in the less severe forms of the disease; but where crusts have collected on the sides and roof of the nasal passages, the only effectual method of washing them away is by means of a douche, emitted with considerable force from the apparatus. Those who prefer the douche or the syringe may use Dobell's solution (formula No. 52). Bayer, however, states that carbolic acid is

not to be recommended locally, because it often completely destroys the power of smelling in those cases in which it has hitherto been preserved. Chlorate of potassium, or liquor potassii permanganatis may be substituted for the borax.

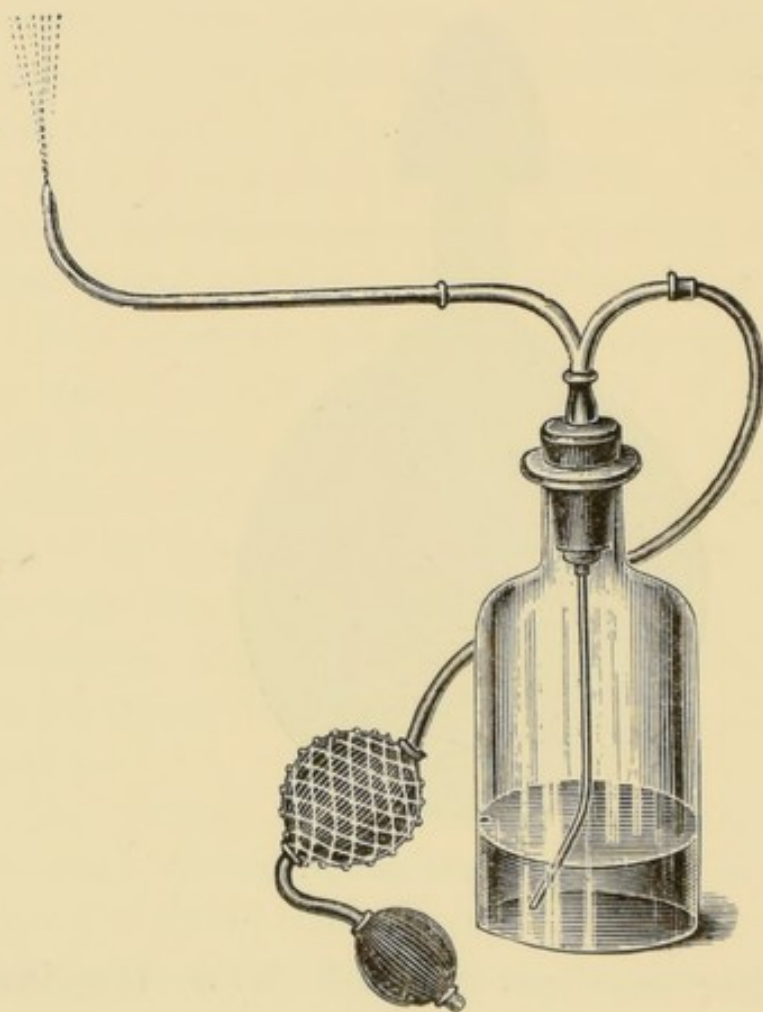


FIG. 15.—Posterior Nasal Spray.

We have found "listerine," an American preparation containing thyme, eucalyptus, and other essential oils, together with benzo-boracic acid, a most serviceable and pleasant disinfectant. It may be conveniently employed in Dobell's solution, instead of the glycerine of carbolic acid, in proportion of one or two of listerine

to ten of the lotion. As, on account of the chronicity of the disease, the employment of expensive drugs, or any drugs at all for the matter of that, is a question of serious consideration to people of limited means, it is often necessary to use the cheapest preparations. For this purpose, common salt, 2 drachms in half-a-pint of water, or chlorate of potassium 1 drachm, or liq. potass. permang. 1 drachm in same amount of water, will be found very useful (formula No. 55).

Many of the alkaline salts, alone or in combination, are made up in compressed form and are of great convenience to patients on account of their porta-

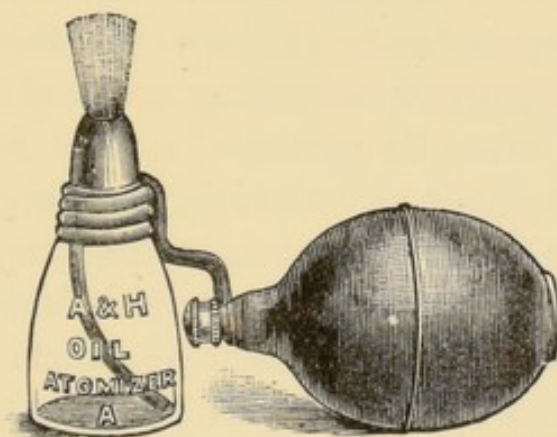


FIG. 16.—Oil Atomiser.

bility. The Compound Phenol Tabloid (formula 54) is particularly useful in cleansing the nostrils in atrophic rhinitis.

The following is the usual line of treatment which we adopt:—The nostrils are first cleaned by a simple alkaline spray or douche in the manner already described. Any crusts which remain are then carefully removed by means of nasal forceps or cotton-wool mops on a suitable holder. The nostrils are next sprayed with an atomiser (fig. 16) containing one of the liquid paraffins holding in solution some menthol and pos-

sibly one of the essential oils (formula No. 66). Other oils may of course be added according to the needs of the case. By this means a fine oily coating is deposited upon the nasal mucous membrane which not only reduces the smell by preventing the rapid formation of crusts, but the fœtor of the latter is partly overcome by the fragrance of oils contained in the solution. In addition such medicaments may themselves exert a healthy influence on the diseased mucous membrane. This treatment should be carried out twice or thrice daily by the patient for a week. If on re-examination the crusts have much diminished and the nostrils are fairly sweet the treatment may be continued. If, however, there is no marked improvement the nostrils should be again cleansed and the most unhealthy areas of mucous membrane painted over by means of a wool mop saturated with such a pigment as formula 45. This is an excellent stimulant to the mucous membrane, producing a free flow of mucus which lasts from one to two hours, and nearly always has a beneficial effect. Such applications should be made at intervals by the surgeon or the patients may sometimes be instructed to apply them for themselves.

In other cases again the crusts seem to form more particularly on certain definite diseased areas and then the application of the galvano-cautery or trichloroacetic acid to these spots will often induce a healthy reaction with diminution of the fœtid crusts.

Where the disease is particularly intractable Gottstein's tampon is very useful. The whole nostril should be plugged with medicated wool (*e.g.*, menthol wool) which acts as a stimulant and induces a free watery discharge. On removal of the tampon the nostrils should be thoroughly cleansed.

In order to flush the unhealthy mucous membrane with blood, MacDonald advises that the anterior nares be lightly plugged with wool, so that nasal respiration, more especially inspiration, will produce considerable negative pressure within the nostrils. Such plugs should be worn for a quarter of an hour three or four times daily.

The majority of cases of atrophic rhinitis will improve materially under some such treatment as sketched out above, but whatever be the medicament applied to the nostril it must be distinctly understood, that it is not so much the particular drug employed, as the regularity and thoroughness with which the treatment is carried out, which conduces to the amelioration of the disease.

Again, it is often beneficial to ring the changes on the solutions employed for cleansing the nasal cavities.

Before leaving the subject of treatment it may be well to mention some other means which have been suggested, all of which in the hands of their advocates are credited with some measure of success. Amongst solutions for washing out the nasal cavities, the following have been recommended:—potassium permanganate and sodium chloride, $\text{āā gr. v. ad } \frac{3}{4} \text{ j.}$, creolin 1 in 500-1000, perchloride of mercury, 1 in 2000, peroxide of hydrogen, 10-15 per cent. solution, formalin 1 in 2000 as a spray, after cleansing the nostrils by an alkaline douche (Bronner), chlorate of potassium, 2 per cent. solution with 10 per cent. glycerine (Sidlo), followed by plugs of cotton wool soaked in a 25 per cent. solution of glycerine in water, introduced once or twice a day and allowed to remain an hour. Insufflations of iodol, iodoform, boric acid, aristol (iodide of thymol), salicylic acid, camphor, &c., have all been used in the endeavour to produce a healthy reaction in the mucous membrane

when the crusts and secretions have been removed. Bryson Delavan, of New York, recommends the employment of the galvanic current in the following manner:—The positive pole of a constant current battery being applied to the nape of the neck by means of a flat sponge electrode, the negative pole is applied directly to the nasal mucous membrane by means of a piece of common copper wire, around which has been loosely wrapped a pledget of absorbent cotton, saturated with lukewarm water. The strength of the current should range between four and seven milliampères, and the sitting last until the irritation caused by the current has been sufficient to provoke a slight watery discharge, usually from five to ten minutes.

Finally, the similarity between the Klebs-Loeffler diphtheria bacillus and those found in atrophic rhinitis has induced some authorities to try injections of Roux's diphtheria antitoxin in the latter affection. Moline reports the cure of three advanced cases by repeated injections of 10 c.c. of the serum. It is said that the crusts diminish, the nasal secretion increases, the fœtor disappears, and the mucosa becomes moister and redder. We should hesitate to recommend a treatment associated with some inconveniences and possible danger until further evidences of its value are forthcoming.

The list of drugs, and methods of treatment are numerous, their very number being a proof that there is no specific form of treatment for chronic atrophic rhinitis.

8. MEMBRANOUS RHINITIS.

*Fibrinous or Croupous Rhinitis.**

A form of inflammation of the nasal mucous membrane, accompanied by the formation of a membranous exudation on its surface.

Ætiology.—Two forms of croupous rhinitis occur—one in which the nasal mucous membrane is primarily attacked, and the other in which the nasal affection is secondary to the formation of false membranes on other mucous surfaces. The secondary variety (apart from diphtheritic cases) is extremely rare. Seifert has recorded a case in which, after an attack of pneumonia, plastic bronchitis developed, and, later on, false membranes formed in the nasal passages. The remarks which follow apply only to the primary variety.

Primary croupous rhinitis is essentially an affection of early life. Of 36 cases recorded by Lack, nine cases occurred under 4 years of age, twenty-four were aged from 4 to 8 years inclusive, one was 9, one 11, and another 15 years of age. The disease usually appears without any exciting cause being discoverable. The use of the galvano-cautery in the nostrils is occasionally followed by a membranous exudation which, however, is limited to the cauterised surface.

The disease is by no means so uncommon as has been supposed. Sixteen cases occurred in one children's hospital in one year.

The fact is that a large number of cases do not come under treatment at all, because the general health is

* See exhaustive article by Lack, *Med.-Chirurgical Transactions*, vol. lxxxii.

so little affected and the patient is supposed merely to have a chronic cold. Recent researches leave little doubt as to its infectious nature.

Morbid Anatomy and Pathology.—The exudation is of a fibrinous nature and is of a whitish colour, more or less firmly adherent to the subjacent mucous membrane, and when removed a bleeding surface is left. Occasionally, however, the membrane is loosely attached, and can consequently be removed without causing bleeding. The exudation is limited to the nasal mucous membrane and as a rule the pharynx, naso-pharynx, and tonsils show no signs of disease.

Referring to his bacteriological investigations in 33 cases, Lack says:—"The results of these experiments, briefly stated, show that in cases of fibrinous rhinitis an organism is constantly found in extraordinarily large numbers which resembles, morphologically and by its growth on various culture media, the true Klebs-Loeffler bacillus. The bacillus is of varying but usually great virulence, is capable of producing virulent toxins, and these toxins as well as cultures of the living bacilli are neutralised by diphtheria antitoxin.

"These experiments place beyond doubt the identity of the bacilli with the true Klebs-Loeffler bacillus, and also show that the mildness of the affection in no way depends upon the slight virulence or feeble toxin-producing powers of the organisms "

Symptoms.—The attack begins like an ordinary cold, the nostril quickly becomes blocked, whilst constitutional symptoms may be entirely absent or only amount to those of malaise. So much is this the case that children suffering from the disease may continue going to school or play about as if in perfect health, hence the ease with which these cases are overlooked

and the main reason of their supposed rarity. The real nature of the attack is only recognised by the expulsion of membranous shreds from the nose or by a rhinoscopic examination. The secretion is more abundant than in acute rhinitis; it becomes muco-purulent and somewhat foetid, and causes excoriation of the upper lip. The septum and the inferior and middle turbinals are the favourite seats of the exudation, but it may occur on any part of the pituitary membrane. The affection may be unilateral and if the discharge be purulent the symptoms closely resemble those associated with a foreign body in the nose. Epistaxis may occur, but when it does so, it is usually late in the disease.

Diagnosis.—There should be no difficulty in distinguishing these cases from true nasal diphtheria, for in this latter disease we have an acute onset with grave constitutional symptoms often ending fatally. The nasal discharge is purulent, bilateral, acrid, and often foetid, the exudation is not confined to the nares, but appears also on the soft palate and fauces, and early epistaxis is common. Should the patient recover, paralytic sequelæ are common. In fibrinous rhinitis the onset may be subacute or chronic, the nasal obstruction (possibly unilateral) being associated with a watery or perhaps purulent discharge, whilst epistaxis if it occurs is usually a late symptom. Constitutional symptoms are commonly absent whilst paralytic sequelæ are unknown.

If the discharge be purulent and unilateral, careful examination (possibly by anæsthesia if the patient be very young) will be necessary to exclude the presence of a foreign body.

Prognosis.—In the newly-born, membranous rhinitis, by causing nasal stenosis, may prevent the breast being

taken, and hence endanger the life of the small patient. In other cases the affection is free from danger but somewhat tedious, its average duration being about five weeks. When the disease exists in combination with a membranous exudation on other parts of the respiratory track—the *secondary form*—the outlook is very grave.

Treatment.—The expulsion of the false membranes should be accelerated by alkaline and antiseptic sprays, Nos. 50 to 53, but they should not be forcibly removed by forceps or other instruments. The mucous membrane may be painted with a mixture of papain and lactic acid (formula No. 42). Moure advises that the nostrils be swabbed out with a solution composed of two parts of lactic acid, three of carbolic acid, and thirty of glycerine. All caustic applications should be avoided. Tampons of cotton-wool soaked in an oily solution of menthol, and insufflation of iodol or iodoform, have been recommended. A child suffering from the affection should as far as possible be isolated, because the disease is undoubtedly infectious and may give rise to throat affections in those brought into contact with it, but such infections are, clinically, quite distinct from diphtheria.

9. CASEOUS RHINITIS.

This rare affection is sometimes called cholesteomatous rhinitis. It is not to be regarded as a distinct disease and is probably due to caseation of pus originating in one of the nasal accessory cavities. The symptoms complained of are more or less marked

nasal obstruction with headache and anosmia, whilst an unpleasant smell is noticeable to the patient's friends. The following appearances were met with in a case under my care (H. T.). The patient was a middle aged healthy female. In the upper part of the right nasal cavity was a soft putty-like mass surrounded by very vascular polypi. The latter were removed by a cold snare and the former by means of a sharp spoon. A large opening into the antrum was then noticed and that cavity also contained a quantity of the same material which was removed by means of the spoon and warm alkaline douches. Considerable atrophy of the intra-nasal structures was present, the inferior turbinal being very loosely attached to the outer nasal wall. The affection did not return. According to Massei, in all true cases of caseous rhinitis the streptothrix alba is present and plays an active part in the production of the disease.

10. NASAL REFLEXES.

It is well-known that if the nasal mucous membrane be irritated by cold, dust, or the application of a foreign body (*e.g.*, probe) we may get any one or more of the nasal physiological reflexes, viz., sneezing, cough, lacrymation, or vaso-motor changes with increased secretion. The term reflex is here used to imply any generation of nerve force, manifesting itself in sensory, muscular, or vaso-motor disturbances, which occurs as the consequence of an impression received by a nerve centre from a peripheral sensory nerve. Such disturbances may occur in the area from which the primary impression started or in a more distant region.

The sensory nerve supply of the nasal mucous membrane is derived from the nasal branch of the ophthalmic division of the fifth nerve, and by branches from Meckel's ganglion. The latter by its posterior branches is in intimate connection with the Gasserian ganglion and the sympathetic branches on the carotid, and therefore we have no difficulty in understanding the diverse reflex effects which may arise within the area of distribution of the trigeminal nerve, or in more distant parts which are within its spheres of influence.

According to Hack's original observation a distended condition of the cavernous tissue of the anterior part of the inferior turbinate may lead to numerous reflex affections. We now know that, in addition to this, there are certain other more or less well-defined sensitive or "hyperæsthetic areas" in the nasal mucous membrane. The most important of these are (*a*) anterior extremity of the inferior turbinal (Hack), (*b*) posterior extremity of the inferior turbinal and corresponding part of the septum (J. Mackenzie), (*c*) mucous membrane of the vestibule (Sajous), (*d*) anterior end of the middle turbinal and corresponding part of the septum, (*e*) region around the Eustachian orifices. Such sensitive areas are as a rule best marked when pathological conditions are present *e.g.*, spurs, hypertrophic rhinitis, &c.

The sneezing and lacrymation which occasionally follow the use of a nasal probe, and the cough and laryngeal irritation which may accompany the passing of an Eustachian catheter are familiar instances of such reflexes. Like many others since his original observations were published, Hack erred in attributing to altered conditions of the turbinals too great a rôle in the causation of various affections occurring even in remote organs of the body, although the result of more recent ob-

servation has been to show that his investigations afford the clue to the interpretation of some facts, which were before involved in obscurity. Among the affections which have been attributed to a reflex nasal neurosis may be mentioned the following: hay fever, paroxysmal sneezing, and coryza. The connection between these and an irritable condition of the nasal mucous membrane is obvious. Asthma, nightmare (regarded by Hack as an incomplete attack of asthma), cough, and dyspnœa, exophthalmic goitre, palpitation and other forms of cardiac neurosis, spasm and paresis of the larynx, spasm of the œsophagus, and vomiting; various affections of the nervous system, *e.g.*, neuralgia, migraine, supra- and infra-orbital headache, vertigo, epilepsy, chorea, stammering, and aprosexia (see p. 75). Among eye affections, cases of keratitis, conjunctivitis, imperfect vision, glaucoma, lacrymation, blepharospasm. Redness of the face and nose, and acne rosacea have been observed. Although it may be true that such diverse symptoms may have been relieved by intra-nasal treatment (and Kjellman reports 15 cases of epilepsy cured by removal of pathological conditions of the nasal mucosa), yet our experience can corroborate these statements only in so far as they apply to some cases of hay fever, paroxysmal sneezing and asthma, although we do not for a moment deny that other good results such as above stated may be occasionally experienced.

We would point out that similar statements have been made regarding the far reaching good to be derived from the treatment of uterine irregularities, and a caution is necessary lest we too hastily conclude that a varying peripheral factor is of more importance than possibly a constant, but as yet undiscovered, constitutional or central cause.

In the opinion of Hack the swelling of the cavernous tissue of the inferior turbinal was the necessary link in the chain of the reflex process for numerous diseases, whereas, now it is generally agreed that almost any pathological condition within the nose *may* serve as the starting point of the reflex disturbance, and most modern rhinologists would lay more stress upon a general or localised hyperæsthesia of the nasal membranes as the immediate factor, especially if such abnormal excitability occurred in association with other pathological changes already referred to.

In an individual case the difficulty lies in determining what is the share to be allotted to each of these factors in the production of a supposed reflex effect. Or again is a third factor to be sought for, such as a neurotic disposition of the individual.

Here we must bear in mind as Gottstein has pointed out, that hypertrophic rhinitis, spurs, and other irregularities may be found in many individuals without any nasal symptoms whatever and should they be found in a neurotic person it does not necessarily prove that his nervous symptoms are due to such nasal defects, whilst to concentrate such a patient's attention upon his nose may be fraught with untold evils.

In the consideration of this subject we must not forget the many instances we have seen and ourselves experienced where intra-nasal treatment in apparently suitable cases has failed to relieve symptoms which were considered of reflex origin, and, moreover, it should be remembered that some of the nasal lesions may be the result and not the cause of a certain neurosis; *e.g.*, hypertrophic rhinitis might result from a long-continued vaso-motor paresis of sympathetic origin (J. Mackenzie). Bosworth, although an upholder of

the reflex theory, questions whether some of the so-called nasal neuroses may not be really due to a disturbance of the normal physiological relation which exists between the nasal cavities and the lower air-passages. Hopmann also believes that many of the ocular affections accompanying intra-nasal disease are due to direct propagation of the inflammatory nasal processes, and Bresgen that certain skin changes of the face, met with in nasal disease, are due to venous congestion produced by intra-nasal obstruction. Finally, the so-called nasal cough instead of being of reflex origin, may in some instances be due to secretion falling into the larynx from the posterior nares.

In support of the theory, however, are the very numerous instances in which the destruction of hyperæsthetic areas of mucous membrane, the removal of nasal obstructions, polypi, adenoid growths, &c., have once and for all cured or greatly relieved many local or remote symptoms. Voltolini's classical case of the cure of asthma by removal of nasal polypi is an excellent example to this effect, and we only draw attention to the weak points of the reflex theory because our recognition of them will place us in a better position for scientifically treating our patients, of dealing with every case on its own merits, and perhaps eventually solving the mystery which surrounds the subject of reflex nasal neuroses. The whole danger lies in the too enthusiastic application of a theory which, though of inestimable value in a certain proportion of cases, yet is liable to gross abuse and productive of disastrous results when hastily invoked as the "probable cause" of symptoms in near or remote organs.

Treatment.—The more we see of treatment directed against the nasal condition supposed to be at

the bottom of certain neuroses, the more convinced are we that it is impossible to predicate, in any given case, whether the line of treatment suggested will benefit the patient. There are some cases, however, in which a better prognosis can be given than in others, and we agree with McBride that if a hyper-sensitive spot can be found on the nasal mucous membrane, irritation of which by a probe or otherwise, produces a well marked reflex effect, *e.g.*, a cough or sneezing, then destruction of such an area is quite likely to be followed by the relief or cure of the reflex symptom. The author referred to lays great stress on the relation of such "cough spots" to asthma (*vide infra*). In most cases, however, it is manifestly our duty, as Semon has pointed out, to lay before the patient at the commencement of the treatment, the position of affairs, so that he may clearly understand that the procedure is more or less in the nature of an experiment. At the same time, he may be assured that the risk of doing any damage is very small, and that cocaine practically abolishes pain.

Occasionally, however, intra-nasal treatment has had an undesirable effect. Semon, for instance, has recorded a case of "unilateral, incomplete Graves' Disease," which came on in a patient from whose nostrils he had removed polypi. Laurent has reported the case of a man in whom slight hypertrophy of the turbinals had given rise to a certain degree of oppression. The swelling was removed by eight applications of the thermo-cautery and chromic acid. As the oppression increased instead of lessening, Laurent was of opinion that cicatrices produced by the cauterisations irritated the terminal filaments of the trigeminal. Cases of otitis media, meningitis, and death, have followed the use of the galvano-cautery (see p. 26). If, after the matter has been placed

clearly before him, the patient is anxious that surgical measures should be adopted, then any abnormal conditions of the nose, such as hypertrophic rhinitis, deflection and spurs of the septum, polypi, &c., should receive appropriate treatment. While, however, the local condition is being attended to, the general health of the patient should not be neglected, and it is in this respect that the risk of a too exclusive specialism comes into play.

11. VASO-MOTOR RHINITIS AND HAY FEVER.

By the term vaso-motor rhinitis is meant the sudden swelling of the nasal mucous membrane, brought about by vaso-motor paralysis, due to psychical, mechanical, or other causes. Accompanying this condition there may be sneezing and profuse watery discharge from the nose.

Under this head are included cases of hay fever, due to the irritation of the pollen of grasses, cases of paroxysmal sneezing and coryza, due to the action of other irritants, and the so-called periodic cases (Sajous) occurring in neurasthenics, dyspeptic and gouty individuals in which, without any apparent reason, the erectile tissue of the nose swells up for a time and as suddenly contracts. There may be little or no secretion or sneezing, or on the other hand there may be violent sneezing with a profuse limpid discharge, especially is this the case in the neurasthenic patients, where the symptoms may be regular in their onset and cessation, and exhausting in their effects. As hay fever is the chief representative of the class, it will be convenient to point out its principal features, adding a few remarks on the other varieties.

The result of the attention that has been paid to the pathology of hay fever in recent years is to clearly establish that persons of a neurotic constitution, in whom there exists some abnormality in the nasal mucous membrane, or even in the conjunctiva, may, as the result of exposure to certain irritant particles (which vary according to the idiosyncrasy of the individual), show all the symptoms which are usually included under the designation of hay fever. The combination of these three factors being required explains the fact that, though thousands are exposed to sources of irritation, such as the pollen of certain grasses, only an exceedingly small number suffer any inconvenience. Bosworth has pointed out, and most physicians will agree with him, that hay fever and asthma are intimately connected. He advocates the view that, like hay fever, asthma is also dependent on three conditions:—(1) a general neurotic condition; (2) a diseased condition of the nasal mucous membrane; (3) some obscure condition of the atmosphere exciting the paroxysms. The same authority is also of opinion that a sufficient cause for the asthmatic attack may be found in the nose in every single instance; and he states that in few instances has he failed to give marked relief by treatment entirely confined to the nasal passages. Schmiegelow's statistics, with reference to the intimate association between nasal diseases and asthma are sufficient to lead to that organ being examined in all cases where the lung symptoms are present.

Ætiology.—In every case of hay fever, at least three factors are concerned in the production of an attack—(1) a general nervous constitution of the individual; (2) a local irritability or pathological state of the conjunctival or nasal mucous membrane; and (3) some

direct exciting cause. As regards the first, it is to be noted that the greatest sufferers from hay fever are the English speaking peoples, but it is also met with in other races, though much more rarely. An instance of it occurring in a negro has been recorded. As a rule, the victims are persons belonging to the educated classes, whereas labourers almost entirely escape. Again, inhabitants of towns are more prone to be attacked than country folk. Men are much more subject to the disease than women; and heredity exercises a powerful influence.

We are indebted to Daly, of Pittsburgh, for the greatest step in advance in the knowledge of the disease, since he was the first to recognise the second factor concerned in the causation of hay fever, viz., a local irritability or pathological condition of the nasal mucous membrane. Amongst these we may mention (1) hyperæsthetic areas; (2) forms of hypertrophic rhinitis; (3) spurs and other septal or turbinal irregularities; (4) polypi and post-nasal adenoid growths. Though this irritability of the mucous membrane is most marked in the nose, there are cases in which the conjunctiva seems to be the starting point of the attack; hence, it is only fair to assume that the conjunctival, as well as the pituitary mucous membrane, may be concerned in the onset of hay fever. The remaining factor is the direct exciting cause. Careful and prolonged investigation has shown that, in this country at all events, the pollen of certain grasses, more particularly the *Anthoxanthum odoratum*, is the most powerful exciting cause of hay fever. Blackley estimated the number of pollen grains present in the air during a stated period by exposing slips of glass, and allowing any solid matter the air may contain to deposit on the

glass. He found, from personal experience, that the presence of the greatest amount of pollen "corresponded tolerably well with the period of the greatest intensity of the disease." In the United States, the pollen of ragweed is especially active in producing attacks. It is now, however, well known that other sources of irritation, such as dust, or even the perfume from some plants, or the odour of certain animals, are capable of starting an attack in those predisposed to it. Exposure to a bright light may also start it off. Heat aggravates the symptoms of hay fever. Rain, on the other hand, washes the atmosphere, and carries away the irritant particles. In hot, dry weather, hay fever is particularly troublesome.

Morbid anatomy and pathology.—The subject of reflex nasal neuroses has already been discussed. It will therefore be sufficient to say that changes in the nasal mucous membrane play a prominent *rôle* in the production of hay fever; and it has been shown that preternatural irritation of the Schneiderian membrane, from any disease whatever, will render it liable to respond to the effect of influences which would be entirely innocuous if applied to a healthy tissue.

The changes met with in the nose in cases of hay fever are usually of a hypertrophic character, and constitute the condition known as hypertrophic rhinitis; the whole nasal cavity may be affected, or there may be only a puffy swelling of the inferior or middle turbinated bodies, or a patch of erosion on the mucous membrane. Polypi, deflections of the septum and spurs, have been observed in some cases. In yet others no abnormality whatever can be seen and it is only by carefully searching over the mucous membrane that in some of these cases the hypersensitive areas already mentioned are

discovered, often by the fits of sneezing or coughing which are induced by touching them with a probe. In a case of prolonged duration under my (F. de H. H.) care, all symptoms ceased as soon as a perforation in the septum had taken place, apparently proving that the irritable zone from which the reflex stimulus started was situated on the septum. It will thus be seen that there is no one special form of nasal disease associated with hay fever, but that it may occur in connection with almost any variety. Whatever the persisting local changes may be, a paroxysm of hay fever is invariably accompanied by swelling and engorgement of the cavernous tissue, which forms so important an element of the inferior turbinated body, but which is also present on the middle turbinate and the corresponding portion of the septum. This swelling is brought about by vaso-motor paralysis. As a consequence of this, there is a rapid exudation of serum into the tissues of the part and upon the surface, giving rise to the profuse watery discharge which is so prominent a feature of hay fever. The swelling of the membrane leads to nasal obstruction and pressure on the septum, as well as the irritation and pain which are thereby caused.

Symptoms.—The attack usually commences as a severe cold in the head, and the patient complains of intense irritation and stuffiness in the nose, so that nasal breathing may be impossible while the senses of smell and taste are abrogated. There is also a profuse watery discharge from the nose, with incessant sneezing. In some patients, the sneezing occurs in regular volleys until he becomes quite exhausted; or the attacks may follow so rapidly that cyanosis or collapse ensue. The catarrhal condition may also extend up the Eustachian tubes, giving rise to deafness and tin-

nitus. In some cases, the disease extends down the throat, causing a feeling of dryness and itching in the fauces; and if the bronchial mucous membrane be attacked, there will be cough and a sense of constriction across the chest. Well-marked asthma may accompany an attack such as above described, or constitute its chief feature, the symptoms of coryza being less marked. In most cases associated with, or even preceding, the nasal symptoms there may be intense conjunctival irritation and congestion, with lacrymation and photophobia.

As regards general symptoms, there may be a slight amount of pyrexia, but it is frequently altogether absent; the pulse is usually somewhat accelerated. The attacks have a depressing influence on the patient generally, and there may be evidences of gastric disturbance. Urticaria is sometimes associated with hay fever, and herpetic vesicles occasionally occur on the lips.

True hay fever usually begins at the end of May or the commencement of June, and lasts about five or six weeks in this country, or even longer in severe cases. In the United States cases often run on from May to the end of September.

Diagnosis.—The catarrhal symptoms which mark the onset of the attack, and the occurrence of violent sneezing after exposure to a source of irritation, (in typical cases the pollen of various grasses), usually suffice to render the diagnosis easy. The only cases which present any difficulty are those in which symptoms of asthma appear without a previous catarrhal stage; but these can usually be distinguished from ordinary asthma by the fact that the attack occurs by day, and that it can be traced to the inhalation of some irritant or odour.

Prognosis.—The result of the great attention, which has been directed to treatment of the local conditions existing in the nose, has been to remove hay fever from the list of incurable diseases. In the majority of cases, great relief can be afforded by appropriate local treatment, and in a certain number a complete cure may even be obtained. The more marked the local mischief and the less the neurotic tendency of the individual, so much the greater is the probability of success. The indications pointing to the probability of success in any given case are, however, too uncertain to allow of a definite opinion being expressed as to the ultimate result of the treatment. It is well therefore to explain to every patient, before commencing local treatment, that this must of necessity be looked upon as more or less of the nature of an experiment.

Treatment.—Bearing in mind the various factors concerned in the production of the disease, it will be desirable, in the first place, to improve the general health of the individual as far as possible, more especially where the vaso-motor rhinitis is of gouty, dyspeptic or neurasthenic origin, and where the periodic nasal obstruction seems to largely depend on a constitutional dyscrasia. Here diet, open air exercise, free action of the bowels and skin, with nervine tonics and possibly in a few cases the light application of the galvano-cautery to the unhealthy mucous membrane would be the line of treatment to follow. In other cases, however, constitutional treatment, though often very helpful, will not by itself suffice to effect a cure. The severity of many cases is aggravated by the injudicious use of stimulants, for although alcohol may relieve the depression of the disease yet its dilating effect upon the arterioles is far from beneficial, to say

nothing of the more remote evils that may result from its use. With regard to hay fever the most important of the vaso-motor neuroses, Morell Mackenzie speaks highly of valerianate of zinc in combination with compound galbanum pill (formula No. 46) given two or three times a day. Tinctures of opium and belladonna alone or in combination, and hypodermic injections of morphine and atropine have been praised but the disadvantage of the latter method of treatment is obvious.

In a case of spasmodic sneezing under my care (F. de H. H.), attended with the most profuse flow of watery fluid from the nostrils, the patient is generally able to cut short an attack by putting his feet into mustard and hot water, and taking 5 minims of the liquor morphinæ hydrochloratis, with 1 minim of the liquor atropinæ sulphatis every four hours for three or four doses.

Antipyrine in suitable doses may give great relief but should be ordered with hesitation in such a chronic complaint. Bromide of potassium in combination with Fowler's solution (formula No. 24) is useful in allaying the nervous erethism met with in hay fever, while at the same time the arsenic has a tonic effect.

The second point to be considered is the removal of the patient from the exciting cause of the paroxysm, or if this cannot be done, an endeavour should be made to protect him from it as far as possible. Many persons who suffer severely in the country are almost free at the seaside, and a sea voyage has a still better effect. Others again are practically immune while resident in the business parts of large towns. But if the individual cannot escape from the country, he should be instructed to wear "goggles" with pale blue glasses out-of-doors, and a blue silk veil of double thickness over the face.

He should take things as quietly as possible, and exertion in the sun should especially be avoided. On the least suspicion of the complaint commencing, he should bathe the conjunctivæ with a solution of corrosive sublimate 1 in 3000, and the same solution may be cautiously sprayed up the nostrils. Plugging the nostrils with tampons of cotton-wool soaked in glycerine is very useful in some cases.

Lastly, the greatest care should be taken to examine the nasal passages, with the view of discovering any departures from the normal condition which may exist in them. If a puffy swelling of the turbinated bodies exist, or the mucous membrane be hypertrophied, or if highly sensitive areas are discovered, the use of the galvano-cautery can be highly recommended. Under cocaine anæsthesia the galvano-caustic blade should be drawn along the mucous membrane so as to score it freely, or the fine point may be passed into the tissue in several places. Whichever plan be adopted, as healing occurs contraction takes place, and the undue sensitiveness of the surface is thereby destroyed.

Similarly nasal polypi, post-nasal growths, marked septal irregularities, and swollen middle turbinals should be dealt with, especially when they are highly sensitive to the touch of the probe. One of us (H. T.) removed the anterior portion of a swollen middle turbinate in a very bad case of hay fever, and the patient was able to cycle on dusty roads and spend hours in a hay field with absolute impunity for the rest of the season.

Excellent results may sometimes be obtained in those cases where no lesion is visible by painting the sensitive areas with deliquesced trichloracetic acid after the application of cocaine. Its action seems more pene-

trative than the galvano-cautery. It is a powerful caustic and care should be exercised in its application. Chromic acid, employed as described on page 27, has also been found very useful.

As regards the use of cocaine locally, though the immediate effect of the application of a solution of cocaine to the nasal mucous membrane is to produce an alleviation of the most distressing symptoms of the disease, the effect soon passes off, and the application has to be renewed. As a result of the dilatation of the blood-vessels, which is a secondary effect of cocaine, the mucous membrane increases in thickness, so that eventually cocaine aggravates the evil it temporarily relieves. Moreover, the seductive effect of the drug and the risk of starting the cocaine habit should not be forgotten. We would strongly urge upon members of the profession the need of greater care in the prescribing of sprays containing cocaine for the use of patients suffering from hay fever, or from any form of nasal obstruction in which the use of that drug produces temporary freedom of the nasal passages in addition to that extraordinary feeling of *bien être* so characteristic of the drug. The inevitable reaction of depression ensues which is at once relieved by the drug and quickly the cocaine craving may result. The condition of the patient is then as hopeless as that of the morphia taker or the confirmed alcoholic, and his physical and mental capabilities are a true index of his shattered nervous system. A ten or twenty per cent. solution of menthol dissolved in almond or olive oil, or liquid paraffin, and sprayed over the nasal mucous membrane, has yielded good results, and has none of the drawbacks of cocaine. If the more radical treatment be out of question, or be objected to by the patient, anointing the interior of the

nose with an ointment consisting of vaseline and oil of eucalyptus, with or without solution of atropine (formula No. 32), will be found useful. Among minor remedies of use in alleviating some of the symptoms of hay fever may be mentioned carbolized smelling salts (formula No. 73), the inhalation of benzoin, and a spray of a 25 per cent. solution of rectified spirit.

Morell Mackenzie found a solution of acetate of lead the most soothing application to the eyes (formula No. 9), or solutions Nos. 10 and 11 may be tried. To prevent the excoriation which so frequently occurs, the nostrils and upper lip may be smeared over with ung. zinci or ung. acidi borici.

12. CEREBRO-SPINAL RHINORRHŒA.

This term has recently been given by St Clair Thomson to a very rare condition in which a discharge of cerebro-spinal fluid takes place from the nose. His careful study of one case and of the literature connected with the subject have demonstrated the following points:—The disease is one of adult life and is characterised by the discharge of a clear, limpid, transparent fluid from one nostril which may continue both day and night, but is extremely erratic in its onset and in its intermissions. Headache may precede the flow and be relieved by it, the general health otherwise seems little altered, but the constant need of a handkerchief constitutes a great inconvenience. The sense of smell is not affected.

The fluid which escapes is free from taste, smell and sediment, and is practically devoid of albumin and

mucin. Its specific gravity is 1005 to 1010 and a characteristic feature of it is its power of reducing Fehling's solution, which at once distinguishes it from other clear discharges from the nose.

Pathology.—It is highly probable that the sub-arachnoid fluid escapes through the peri-neural sheaths of the branches of the olfactory nerve, and possibly behind this there is some pathological change in the contents of the skull leading to increased intra-cranial pressure.

Diagnosis.—The characters of the fluid have been referred to already. The disease is most likely to be confused with hay fever or other forms of vaso-motor rhinitis. In the latter cases sneezing precedes the flow of a liquid which is slightly viscid, contains mucous corpuscles, gives a precipitate with acetic acid, is slightly coagulable by heat, and does not reduce Fehling's solution. In all these points such a liquid differs from cerebro-spinal fluid. In vaso-motor rhinitis the flow is bilateral, attended by photophobia, conjunctival suffusion and general malaise, and ceases at night; points in which it will be seen to differ from rhinorrhœa of cerebral origin.

Treatment.—Little can be done except to improve the general health. It would be extremely unwise to invite septic complications, by the application of the galvano-cautery to the upper regions of the nose, in an endeavour to check the flow. Baber has reported a case, apparently of this nature, in which repeated applications of the continuous current to the outside of the nose completely cured the case.

13. NASAL DISEASE AND ASTHMA.

The observations of Voltolini, Bernhard, Hack, Fraenkel, and many others have shown that in a great number of cases there is an intimate relationship between these two morbid conditions, and so universally is this fact now admitted that the characteristic dyspnœa of the one is looked upon as the most important reflex of the other.

Such a view is supported by the two following considerations amongst others:—1. The asthmatic paroxysm is often preceded or accompanied by, or alternates with, well marked nasal symptoms and with such regularity that a more than casual relationship between them is obvious. 2. The great and increasing number of cases in which asthma has been cured or greatly relieved by the treatment of intra-nasal lesions.

We believe, however, that few will go so far as Bosworth who regards all cases of asthma as a reflex nasal neurosis and we would remind the reader of those instances in which cardiac, renal and gastric affections would seem to be the exciting cause of the dyspnœa.

In our opinion some obscure neurotic condition is often present in asthmatics and may possibly be the essential factor in both the nasal and lung manifestations. However, whatever theory is adopted, the markedly good results of intra-nasal treatment should lead to the nose being examined in all cases of asthma, as well as search being made for any constitutional defects in the general health.

It would seem from recorded cases that almost any intra-nasal disease or irregularity *may* serve as the

starting point of the reflex, and in some cases mere excessive irritability of the lining membrane without any obvious defect seems sufficient to give rise to the asthmatic paroxysm, if the necessary irritant be forthcoming.

Hence polypi, adenoids, hypertrophic rhinitis in its various forms, spurs, crests or deflections of the septum and hypersensitive areas of mucous membrane, especially when the latter coincides with the other lesions, have all been stated in various cases as the *fons et origo mali*.

With reference to the latter cause McBride states that when irritation of the sensitive areas produces a reflex cough, then destruction of the same may be expected to relieve asthma when they exist coincidently.

We would here join with Semon in emphatically stating, as the result of our experience, that the permanent cures of asthma following intra-nasal treatment are rare, that instances of relief for longer or shorter periods are more frequent, whilst the number of those in whom no result whatever is obtained are unfortunately the most numerous of all.

In each case, therefore, we must at present regard intra-nasal treatment as experimental, sometimes, it is true, it is less so than at others, so that the question naturally arises: How are we in an individual case to prognosticate the result of intra-nasal treatment?

We should be inclined to say that if nasal symptoms regularly preceded, accompanied or alternated with, the asthmatic attack then the treatment of an intra-nasal lesion should be seriously and hopefully considered. More so would this be the case if the nasal lesion consisted of polypi, which (as in Voltolini's classical case) seem on removal to produce the best

result. We may say the same also for adenoid vegetations.

Marked obstructions characteristic of hypertrophic rhinitis, especially when the middle turbinal is swollen and presses unduly against the septum, have given good results on treatment, as also have large septal spurs which produce great obstruction to nasal respiration and are very sensitive to the touch of a probe.

The smaller excrescences and milder forms of hypertrophic rhinitis, which in an otherwise healthy person would be considered devoid of pathological significance, should be regarded as least likely to benefit by rhino-chirurgical treatment.

Finally, patients in whom the asthma is of long standing, where the disease is hereditary and occurs in many members of a family, and again where it appears to be a gouty manifestation and unaccompanied by nasal symptoms, are generally speaking unfavourable cases for intra-nasal treatment.

When asthmatic attacks occur in the course of hay fever, the patient may try iodide of potassium (formula No. 28) or citrate of caffeine (formula No. 15); the addition of bromide of potassium diminishes the tendency to insomnia which is produced by caffeine. For the asthmatic paroxysm, one of us (F. de H. H.) has obtained the best results from nitro-glycerine (formula No. 18), which may be taken every hour for three doses, or the inhalation of the compound lobelia powder (formula No. 48). Before leaving this subject we should like to point out the great importance of attending to the patient's dietary and general constitution with the greatest care, especially eliminating all those factors which might tend to excite an over sensitive nervous system.

14. NASAL STENOSIS.

Under the head of nasal stenosis are included all those conditions of the nose in which there is obstruction, more or less complete, to nasal respiration.

Ætiology.—The causes of the various conditions producing nasal stenosis will be found in the chapters devoted to the individual affections.

Morbid Anatomy and Pathology.—Nasal stenosis may be brought about by alterations in the bony and cartilaginous framework of the nose, by changes in the mucous membrane, by the presence of new growths, or of rhinoliths and foreign bodies, and, lastly, by affections of the naso-pharyngeal cavity and of the tonsils. The alterations in the bony and cartilaginous framework of the nose producing stenosis, are deflections of the septum and the presence of spurs and crests on the septum; in vaso-motor rhinitis we have to do with a temporary condition of stenosis, whereas in chronic hypertrophic rhinitis the obstruction is more or less permanent; but even in cases of this disease, vaso-motor action influences the degree of stenosis. All the different varieties of new growths, non-malignant and malignant, have nasal stenosis for a prominent symptom. Sometimes, as the result of operative treatment, adhesion between the inferior turbinal and the septum may occur, and give rise to stenosis. Lastly, the various affections of the naso-pharynx, *i.e.*, enlargement of the pharyngeal tonsil, adenoid vegetations, fibromas, &c., may all cause a marked degree of stenosis. In addition to the causes already mentioned, cases of congenital atresia, which may be unilateral or bilateral,

have been recorded. Congenital occlusion of the anterior nares is an extremely rare condition. Occlusion of the posterior nares is much more common, and it may be complete or incomplete. In some cases the occluding wall is comparatively thin, thus rendering operative interference fairly easy. In five cases, hearing was perfect. Bony occlusion is occasionally met with, and in others the occlusion is partly bony, partly membranous.

Symptoms.—As the symptoms directly dependent on nasal stenosis are alike, no matter what may be the nature of the lesion giving rise to the obstruction, we have deemed it desirable to devote a section to the consideration of this condition, so as to spare the necessity for repetition.

The first thing that strikes the observant physician, in looking at a series of young people suffering from nasal stenosis, is their defective development. This is more especially the case in a condition which, like adenoid vegetations, dates from early life. The immediate increase in height and weight which follows upon the removal of these growths, is generally very remarkable, and is a striking proof of the deleterious influence exerted on the physical development of the body by defective nasal respiration. Hardly less remarkable is the effect on the patient's mental state. Guye was one of the first to direct attention to the deficiency of brain power exhibited by children suffering from adenoid vegetations, and he especially pointed out that there is an inability in these children to concentrate their attention on any given subject. For this condition he has proposed the term *aprosexia* (inability to attend). As a consequence of this, the acquisition of learning is a slow and painful process, and doubtless many a child

in the past has been regarded as being of defective intellect, whereas the cause was simply the condition just referred to. Patients suffering from nasal stenosis have frequently a pale appearance. Spectroscopic examinations of the blood, made before and after operations performed for the relief of nasal stenosis, have shown that there is a constant increase in the percentage of the hæmoglobin in the blood, which Holbrook Curtis is of opinion is due to the improvement of nasal respiration.

If nasal stenosis occur early in life, and if the patient be at the same time rickety, there will be characteristic alterations in the shape of the chest, the so-called pigeon breast being the result. According to Tubby, between the ages of six and ten years, kyphosis makes its appearance; and from ten to sixteen years of age, scoliosis supervenes on the kyphosis.

Some authorities suggest that the constant hawking, sneezing, and coughing, associated with chronic nasal obstruction, by increasing abdominal pressure, have a tendency to produce hernia.

Nocturnal enuresis is said to occur more frequently in children with nasal obstruction than in others, and one of us (H. T.) has on two occasions seen this trouble permanently cease immediately after the removal of adenoids. Sleep is frequently disturbed and unrefreshing, and nightmare with "night terrors" in children may be the result of obstructed nasal respiration. Snoring is an almost invariable symptom, and mouth-breathing, with its common sequelæ, granular pharyngitis and laryngeal catarrh, occurs, of necessity, if the obstruction be at all complete. When the obstruction is situated anteriorly the voice has a nasal twang, but when the former is more general, as in polypi, post-

nasal growths, hypertrophic rhinitis, then the voice loses its resonance and becomes "deadened" or deficient in resonance. Matheson has drawn attention to the association of stammering and stuttering with nasal obstruction. Scanes Spicer suggests that nasal stenosis and the consequent mouth-breathing have "some influence, in intensifying many of the proximate factors at work in the production of caries of the teeth." The shape of the face and character of the palate are described in the section on adenoid vegetations. The retention of the nasal secretions and the constant difficulty of dislodging them engenders the habit of sniffing and hawking, whilst the pressure upon sensitive areas set up by some of the more pronounced nasal obstructions may become a fruitful source of headache or "tight feelings," "aching" and "numbness" over the bridge of the nose or the lower part of the forehead. Restlessness, twitching, or even convulsions, may occur in children affected with nasal stenosis and in adults melancholia and hypochondriasis have been noted.

The senses of smell and taste are generally much interfered with. Owing to extension of catarrhal processes to the Eustachian tubes, earache, tinnitus aurium, deafness, and otitis media, sometimes accompany nasal stenosis. Curiously enough, as we have already pointed out, cases of complete congenital occlusion of the posterior nares have been recorded in which hearing was unimpaired. In a certain number of cases, disease of the lacrymal apparatus has been traced to nasal stenosis. One of us (H. T.) at once relieved a case of long-standing epiphora by removal of a large septal spur which was tightly wedged into the lower end of the lacrymal duct.

Where one nasal chamber is narrowed and the other

dilated, the mucous membrane in the latter always exhibits well marked hypertrophic changes, but owing to its inability to moisten all the inspired air the secretions tend to dry and occasionally become slightly offensive.

Cough, a sense of suffocation, and various reflex symptoms, *e.g.*, asthma, are not unfrequently associated with nasal stenosis.

In the section devoted to adenoid vegetations will be found some other symptoms due to interference with nasal respiration.

Treatment.—The methods of treating the various forms of nasal stenosis are described under the heads of the different diseases which give rise to it, and we now only deal with those rare conditions of congenital occlusion already referred to.

When this occlusion is situated anteriorly (very rare) the membranous or fibrous obstruction should be pierced with a fine bistoury, and as much of it as possible carefully dissected away. The regular insertion for three to five weeks, or even longer, of a piece of stiff rubber drain tube, or a hollow bougie, will provide for nasal respiration while checking undue cicatricial contraction.

When the posterior choana is occluded, the left index finger is passed into the naso-pharynx to guide the instrument passed backwards through the corresponding nostril with the right hand.

If the occlusion is fibrous it can be perforated with a tenotomy knife, and this replaced by a blunt pointed bistoury which cuts round the circumference of the partition. The opening thus made must be kept patent by wearing or constantly passing backwards an oval hollow bougie, *e.g.*, Down's No. 4 size. Should the

occlusion be bony, then it must be perforated with a small chisel and mallet, the index finger in the nasopharynx guiding the surgeon as before, or the opening can be made by a drill driven by a dental engine. Through the aperture thus made a fine nasal saw is passed, by which means the bony web can be sawn round, or so far divided that careful use of a small gouge and mallet will complete the removal of the obstruction.

15. DEVIATIONS, SPURS, AND CRESTS OF THE SEPTUM.

By the term deviation or deflection of the septum is understood the condition in which the septum, instead of being centrally placed and dividing the nose into two main cavities of equal size, inclines to one side or the other, so as to increase the size of one cavity at the expense of the other. By a spur is meant a rounded or pointed outgrowth, and by a crest is meant an outgrowth extending along the whole or a part of the septum, generally more or less parallel to the inferior turbinal.

Ætiology.—In the absence of any exact knowledge as to the cause of these intra-nasal irregularities, it is not surprising that many theories are invoked to explain their occurrence.

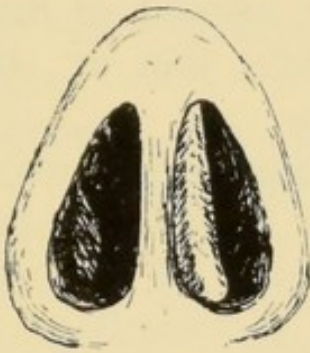
It is, however, probable that they owe their origin to more than one cause. Septal deviations are rare before the seventh year of life after which they become commoner. Traumatism accounts for a great number and hence they are more frequent in males. If we regard as a normal septum, one which is perfectly straight,

free from any irregularities and which divides the nasal cavities into two symmetrical halves, then it is certain that very few noses amongst Europeans could be looked upon as free from defect. While most authorities lay stress on traumatism as a cause of septal deflections, Delavan emphasises the effect of constitutional diatheses and irregular development of the facial bones about the seventh year, especially if there be a high palate which diminishes the vertical depth of the nose, so that the septum has not sufficient room for normal growth. In non-traumatic cases Walsham considers that rickets in conjunction with defective development of the bones of the face plays an important part.

Asch inclines to the view that the unequal development of the bony plates, which coalesce to form the vomer after puberty, is the main cause of deviation, while Collier maintains that the latter is the result of the negative pressure existing with each inspiration behind some anterior obstruction, the septum naturally tending towards the direction of least resistance. Such a negative pressure would also lead to overfilling of the blood vessels and hypernutrition, an explanation advanced by MacDonald to account for the increase in thickness of mucous membrane and other septal structures. Enlargement of the turbinals, polypi, and other tumours of the nasal cavities, if of sufficient size to exercise direct pressure on the septum, may cause it to become deflected; but, as already stated, by a long way the most potent cause is traumatism. This is especially the case as regards injuries inflicted in early life, when the parts are soft and pliable, injuries which may be so easily overlooked in the case of little children, especially when unaccompanied by epistaxis.

Morbid Anatomy and Pathology.—Deviations of

the septum are practically confined to the anterior two-thirds, the posterior third being almost invariably placed centrally. The cartilaginous portion is most generally affected.



H.T.
del

FIG. 17.—Anterior dislocation of septum.



H.T. del

FIG. 18.—Deviation of septum.]]



H.T. del

FIG. 19.—Septal spur.



H.T. del.

FIG. 20.—Deviated septum and spur.

Malformations of the septum may be arranged in the following groups:—

1. Simple deviation. With or without thickening, or spurs.

2. Sigmoid deviation in vertical or antero-posterior direction. With or without thickening, or spurs.

3. Zigzag, or irregular deviation.

4. Spurs or crests, without deviation of septum.

In the simple deviation there will be bulging on one

side and concavity on the other, the bulging being sometimes increased by the presence of inflammatory thickening. If there be sigmoid deviation, there will be obstruction in one nostril anteriorly, and in the other posteriorly. In the zigzag variety, the perpendicular plates of the ethmoid and vomer, instead of making a smooth surface with the cartilage, join at different places, giving rise to irregularities.

Bosworth points out that prominent ridges may occur along sutural lines, viz., the line of junction between the vomer and the palatal process of the superior maxillary bone; the junction of the cartilage of the septum and vomer, ending abruptly at the junction of the upper border of the septal cartilage and vertical plate of ethmoid; or along the whole anterior edge of the vomer, including its union with the cartilage of the septum and the vertical plate of the ethmoid. Walsham suggests that these ridges may possibly be a manifestation of the rickety diathesis. The spurs are probably the result of a local perichondritis or periostitis. Many of the so-called exostoses are merely cartilaginous excrescences.

Symptoms.—The symptoms produced by deviations and spurs of the septum are those due to obstructed nasal respiration; and, as they are fully described under the head of Nasal Stenosis (p. 74), any further description is unnecessary. We would again remind the student that the presence of such nasal irregularities, especially when associated with a hypersensitive mucous membrane, has in many cases seemed to be the source of reflex symptoms in near or distant organs, (*vide* p. 72).

Diagnosis.—Before much attention had been directed to the interior of the nose, spurs and deviations of the

septum were commonly regarded as exostoses. More careful examination has shown that the latter are very uncommon. Deviation, with bulging, of the septum, might be mistaken for a growth in the nostril. If ordinary care be taken in making the examination with a suitable mirror and good light, this mistake should not be possible.

Prognosis.—The result of judiciously planned and skilfully executed operations for the relief of deviations and other deformities of the septum is most satisfactory, and patients usually experience great relief as soon as the obstruction is removed.

Treatment.—The discovery of the existence of deviations, spurs, and crests of the septum has led, in many instances, to quite uncalled-for treatment. In no other part of the body have so many attempts been made to improve upon Nature as in the nose. Judging from the writings of some rhinologists, it would seem that in the nose we have the key to the most complex processes, and that the rectification of septal abnormalities would suffice to cure symptoms referred to the most distant organs. Now, however, that the first burst of enthusiasm is over, there is every reason to believe that the opinion of the moderate men will prevail, and that deformities of the septum will not be interfered with unless there are good grounds for supposing that surgical interference is absolutely necessary. The indications for operation as formulated by Sendziak are as follows:—(1) respiratory troubles; (2) reflex symptoms; (3) aural troubles, and consequent difficulty in catheterisation; (4) interference with the removal of polypi.

The test of sufficiently large nasal passages is ability to sleep at night with the mouth closed. If the patient

is unable to do so, and there are respiratory troubles, *i.e.*, tendency to laryngeal and bronchial catarrh, cough, asthmatic attacks, &c., an operation to remove obstruction is certainly justifiable, and will often yield admirable results. The indications from reflex symptoms are very far from being as clear as those just mentioned. They are certainly more problematical, and an operation should only be undertaken after it has been distinctly put to the patient that the chances of success are, from the nature of the case, somewhat doubtful.

The presence of ear trouble, especially if recent or increasing in severity, would justify an operation; and the same can be said of cases in which abnormalities of the septum interfere with the passage of the Eustachian catheter, or prevent the removal of nasal polypi. In public speakers, barristers, actors, and others, whose living more or less depends upon the condition of the vocal organs, the removal of spurs or septal obstructions may be necessary.

In slight cases of deviation of, or growth from, the septum, it may be possible to improve nasal breathing by treating the hypertrophic rhinitis which frequently accompanies these cases.

It will be convenient to discuss the treatment of spurs and crests before that of deviations of the septum. The methods employed may be arranged under the following heads:—(1) a cutting process, whether by knife, chisel, or gouge; (2) the use of the saw; (3) the trephine; (4) electricity, either in the form of the galvano-cautery or electrolysis.

As in all other surgical procedures in the nostrils, it is important that these cavities be thoroughly disinfected before the operation. The decision as to whether cocaine or a general anæsthetic should be employed

depends upon two factors:—1. The size and situation of the spur. 2. The temperament of the patient. One of us (H. T.) has removed many more spurs under cocaine than under general anæsthesia. Generally speaking, where the operation can be performed with a knife (as upon small anterior cartilaginous spurs), and no primary reflection of mucous membrane is required, then cocaine may suffice. It has the distinct advantage that the patient is operated upon in a sitting position, which is of great help to the surgeon, and the cocaine certainly reduces the hæmorrhage. When sawing or dissecting operations are decided upon a general anæsthetic is advisable, though here again much depends on the patient's power of bearing a few seconds' pain or discomfort, and this factor may involve exception to the general rules above stated.

If the spur is small, cartilaginous and situated anteriorly then two courses are open to the surgeon:—1. To shave it off with its mucous membrane covering and leave the surface to granulate over. The disadvantage of this method is the length of time which healing may take, and the irritation of scab formations in the meanwhile. The hæmorrhage is not usually severe, but may be troublesome if the "artery of the septum" is cut. It can be checked by touching the bleeding point with the galvano-cautery, or by means of a firmly applied dressing of iodoform gauze, which in all cases should be applied to the raw surface for 48 hours. 2. To make incisions through and reflect the mucous membrane covering the spur, shave off the cartilaginous projection, and replace the mucous membrane keeping it in position by means of a silk stitch and a suitable antiseptic dressing. This is a most excellent method because the mucous membrane rapidly

heals, and therefore we would advise its adoption wherever possible.

When a crest or ridge has to be dealt with a sawing operation is usually necessary and the mucous membrane is removed with the bone, because reflection of the former is almost impossible when the spur is half an inch or more beyond the vestibule. Bosworth's saw (fig. 21) or one of its modifications is most often used. It is wiser when possible to saw from below upwards so that blood does not obscure the surgeon's view of his progress. When the crest is nearly divided, the operation

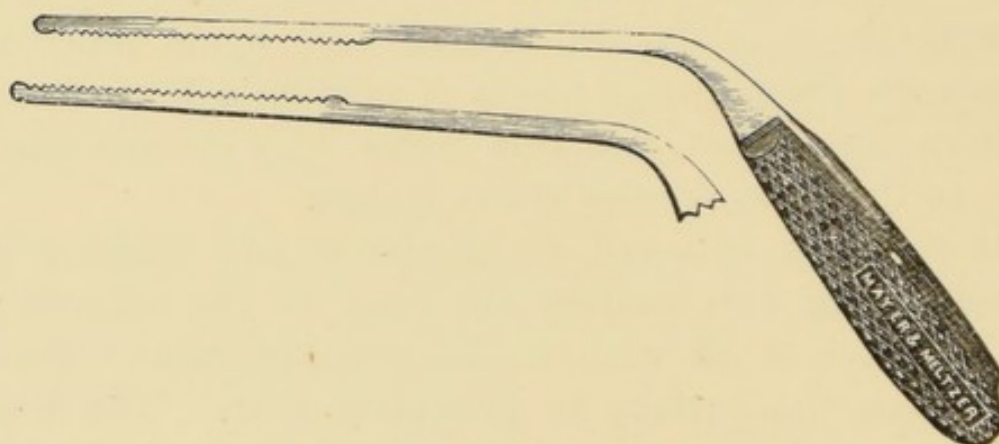


FIG. 21.—Bosworth's Saw.

can be quickly terminated by passing a turbinotome behind the obstruction, fixing it in the saw groove and withdrawing the instrument firmly and rapidly.

An antiseptic gauze dressing should be applied for 48 hours; an excellent one for the purpose is a strip of cyanide gauze wrung out of iodoform emulsion, the glycerine preventing undue adhesion to the granulating surface and thereby obviating much of the pain which is caused when the dressing is changed.

Small trephines with cutting or serrated edges, and driven by an electro-motor or dental engine, are said to act very efficiently in the removal of spurs or septal

crests, and are reputed not to be so painful as the saw or knife (Bronner).

The removal of a large obstruction by either saw or trephine may not be accomplished without perforation of the septum. This accident is not generally of great moment when only a small communication with the other side is made, for the aperture does not tend to increase in size, and it is a lesser evil than inadequate removal of the nasal obstruction for which the operation was performed.

It need scarcely be said that in all these cases a nasal speculum and reflected light are necessary. The hæmorrhage can always be controlled by pressure of a gauze dressing, and if troublesome during the operation may be checked by the application of hot (nearly boiling) perchloride of mercury solution, 1 in 2000, applied on small mops of wool to the oozing surface.

One of the main difficulties met with during these operations and in fact in all intra-nasal operations is the hæmorrhage, which occurring in so small a space quickly obscures the field of operation. It is said by Yearsley and Newcomb that this drawback can be greatly minimised if, some 15 minutes previous to the operation, a solution of supra-renal extract (grs. v. ad ʒj.) is applied to the parts. Its effect is to reduce the hæmorrhage and by producing well marked ischæmia gives more room for the operator to work in. It is claimed that there is no tendency to post operative hæmorrhage after its use. A combination of this gland product with eucaine would seem to be an excellent substitute for cocaine where the toxic action of this drug is marked.

The galvano-caustic loop should never be employed in these operations—it cannot remove a spur and is

very liable to cause sloughing of the septum or to produce adhesions to neighbouring structures during the process of healing.

Moure speaks very enthusiastically of electrolysis in the treatment of deviations (with or without thickening), and of osseous or cartilaginous outgrowths of the nasal septum. He says:—"With it we can operate as energetically or as lightly as is desired; and, thanks to cocaine, it is made almost painless." Moreover, the operation is attended with only very slight hæmorrhage.

In all these spur or crest operations the surgeon will rarely regret having removed too much of the obstruction.

Deviation of the septum.—It is the experience of most rhinologists that all instruments worn to correct deviations or obviate nasal obstruction resulting therefrom are useless and a source of annoyance to the patient. If a nasal obstruction is sufficiently troublesome to need the application of a plug, bougie, or tent, then it is worthy of removal by operative interference.

In the more severe forms of deviation of the septum, excellent results may be obtained from the plan adopted by Walsham. He recommends that, after projecting pieces of the septum have been shaved off, the straightening should be accomplished by forcible rectification with the forceps (fig. 22) he has designed for this purpose, or with those contrived by Thomas Smith. To keep the septum in its new position, some form of retentive apparatus must be worn for a week or ten days, in order to prevent the parts resuming their faulty position. Hollow vulcanite or celluloid plugs, Goodwillie's nasal intubation tubes, or a piece of stout rubber drainage tube, answer effectually. A small rubber bag mounted on a central canula, after the plan

of the rubber nasal tampon for epistaxis, will keep the septum *in situ*, and, by exercising an equable pressure, cause less irritation than the harder plugs.

Recently Asch (N. Y.) has introduced a very successful method of dealing with septal deviations. The operation, to use his words, consists in making a crucial incision through the cartilaginous septum over the most prominent part of the deviation, breaking down by

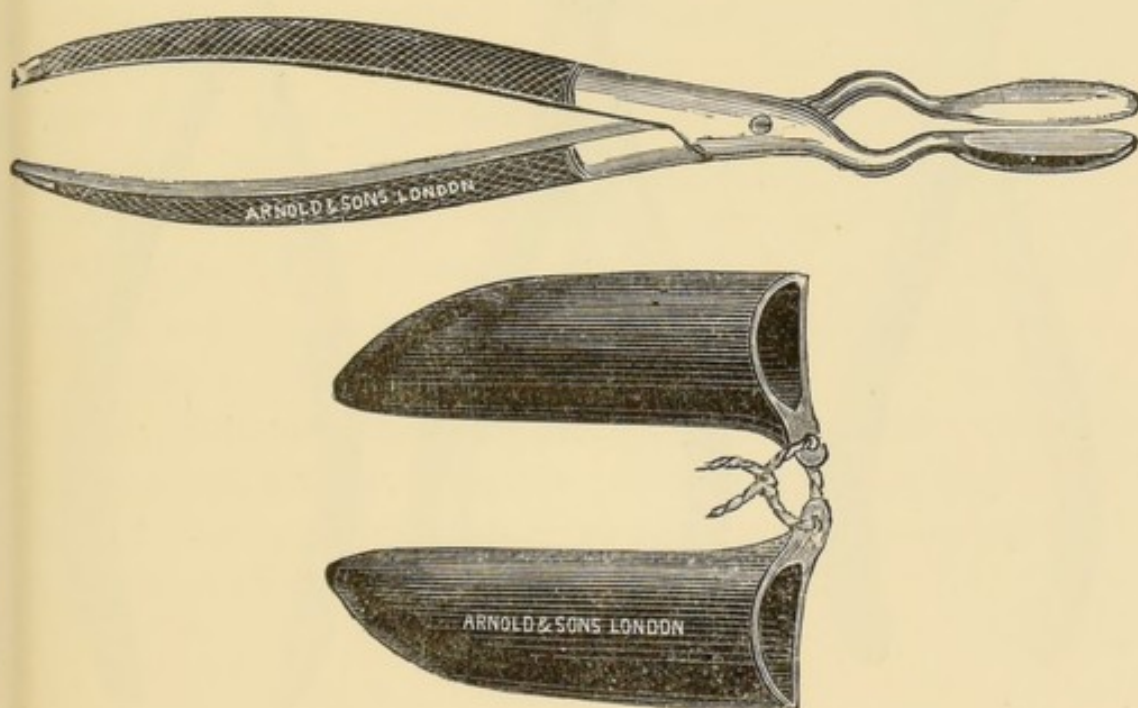


FIG. 22.—Walsham's Forceps and Plugs.

finger or forceps the basis of the segments thus formed and the insertion of a hollow splint. The illustration of the instruments will explain themselves (fig. 23). The blunt end of the scissors is introduced into the obstructed nostril and the cutting blade into the other nostril. When the crucial incision has been made the segments are pushed into the concave side (by finger or forceps) until they are broken at their bases and the resiliency of the septum destroyed. A perfor-

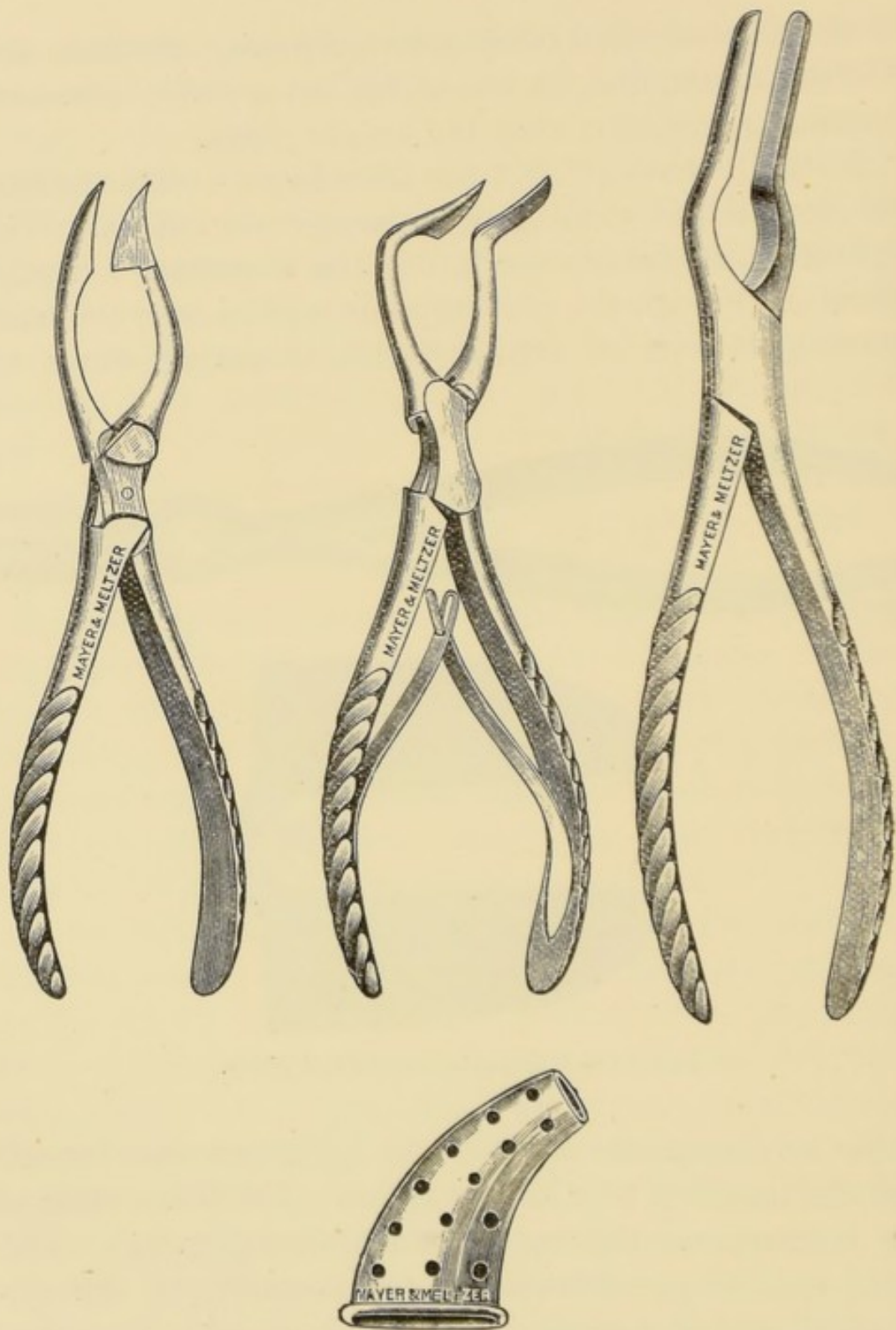


FIG. 23.

ated splint is placed in each nostril, that in the non-obstructed side to check hæmorrhage and give equable support to the larger one placed in the obstructed side.

The first is permanently removed in 24, the latter in 48 hours for washing, to be replaced daily for about 5 weeks, by which time the septum should be firm in a correct position. The operation seems suitable for all forms of deviation.

Finally, there are not uncommon instances in which nasal respiration is impeded, or rendered even impossible, by collapse of the alæ nasi or narrowing of the anterior nares by chronic eczema, lupoid or syphilitic cicatrices of the skin in the immediate neighbourhood. Patients will obtain great relief by wearing, at night especially, small rubber rings very similar to small umbrella rings which can be obtained at any rubber shop. These being placed in the vestibule, do not irritate as do all those artificial aids for stenosis which are in contact with the nasal mucous membranes.

Forcible dilation has been carried out in anterior nasal stenosis, the instrument used (Hill's dilator) being made on the principle of the glove stretcher. The results are not as a rule very satisfactory because they are not permanent.

16. HÆMATOMA OF SEPTUM.

By the term hæmatoma of the septum is meant a collection of blood beneath the mucous membrane of the septum. This condition is almost invariably the result of traumatism.

On rhinoscopic examination a tumour will be seen either in one or both nostrils; it is of a red colour and smooth. At first, fluctuation may be made out from side to side; later on, this may disappear, but if the hæmatoma break down and form an abscess, fluctuation

may again be perceptible. The traumatism which produces the hæmatoma often gives rise to external swelling of the nose.

If the effusion of blood be large, there may be interference with nasal respiration, diminished sense of smell, and alteration in the voice.

Hæmatoma is to be differentiated from abscess of the septum by the less amount of pain and tenderness, and by the absence of febrile disturbance.

The patient should be kept quiet, and an evaporating lotion (formula No. 12), or an ice poultice, should be applied externally. Surgical interference is, as a rule, inadvisable, unless the effusion be very large.

17. ABSCESS OF SEPTUM.

Ætiology.—Traumatism is the usual cause of abscess of the septum. As the result of an extravasation of blood taking place under the perichondrium, a coagulum is formed which breaks down and becomes purulent. In a few cases of so-called acute idiopathic perichondritis nothing more serious than a simple acute coryza has preceded the attack. In such cases it is possible that septic organisms may have gained entry through some slight abrasion in the mucous membrane.

Abscess of the septum may be a complication of syphilitic or tuberculous disease of the nose.

Symptoms.—In acute cases, the symptoms resemble those of facial erysipelas; the swelling of the mucous membrane of the septum is, however, more marked, and may be so great as to occlude the nostrils and protrude externally; the eyelids become puffy, and headache in the naso-frontal region is much complained of.

The nose is red and swollen, and the pain is often acute and of a throbbing character. Constitutional symptoms may be severe considering the limited area of suppuration. In chronic cases nasal obstruction may be the most prominent symptom complained of by the patient.

Prognosis.—The danger to life mostly arises from the possibility of the supervention of erysipelas, septicæmia, or meningitis. Although the suppurative process may cause perforation of the septum, this is usually repaired if the muco-perichondrium is kept intact. Nasal deformity is uncommon.

Treatment.—As soon as there is any evidence of suppuration, a free incision should be made on the side of the septum on which the bulging is most marked. The previous application of cocaine will facilitate the procedure. The nostrils having been cleansed a light antiseptic gauze dressing should be applied over the site of the abscess and constantly changed until the discharge ceases. Externally, lint saturated with lead and opium lotion (formula No. 8) may be kept applied.

Quinine is useful internally, and opium or morphine may be required to relieve the acute pain and procure sleep.

18. PERFORATION OF THE SEPTUM.

The opinion was held, even quite recently, that perforations in the septum were almost invariably of syphilitic origin. Jonathan Hutchinson opposed this view and supported his contention by twelve carefully examined and described cases. In young persons there sometimes appear to be reasons for associating it with

lupus, but in middle age or more advanced life it appears to come on idiopathically, *i.e.*, there are no conditions of ill-health apparent to which it could be assigned. In addition to syphilis and these cases of so-called idiopathic perforation, ulceration of the septum, followed by perforation, is met with in leprosy, tuberculosis, diphtheria and typhoid fever, as a result of traumatism, and in connection with abscess and perichondritis of the septum. Our experience fully accords with Bosworth's, *viz.*, that the common cause of a perforation is to be found in the presence of a cartilaginous projection, the prominent portion of which is gradually eroded away by the constant irritation of dust and other impurities of the inspired air.

This theory is confirmed by the frequency of perforation of the septum among workers in cement factories. In order to get rid of the dust, the finger is frequently introduced into the nose, and in course of time that part of the septum which is abraded by the finger-nail becomes perforated by the constant repetition of the process. The results of inhalation of bichromate of potassium are much more serious. The men usually become affected after they have worked for about a week. They complain of a bitter nauseous taste in the mouth, great irritation of the nasal mucous membrane, with incessant sneezing and conjunctivitis. If they continue at the work, ulceration and perforation of the septum may result. J. N. Mackenzie describes the ulceration as occurring also on the turbinals and in the naso-pharynx. Occasionally middle ear disease complicates the nasal trouble. Perforation of the septum also occurs in workers engaged in the manufacture of copper arsenic green.

Morbid Anatomy and Pathology.—Hajek has

described the pathological changes in perforating ulcer of the nasal septum, which occurs independently of syphilis or tubercle. The first change to be noticed in the mucous membrane is a greyish-white discoloration of the superficial layers which is due to swelling of the epithelial cells, together with the infiltration of a fibrinous substance between them. Necrosis occurs, and a small ulcer with a sharp outline is formed, which increases in size and depth until the cartilage is affected. The edge of the perforation becomes smooth and scar-like.

The changes above described are usually very chronic, months or even years elapsing before perforation is complete. As a rule, the ulceration commences on one side. Fraenkel points out that the perforation generally corresponds to the "site of predilection" of epistaxis, and the orifice of Jacobson's organ, *i.e.*, about half an inch from the edge of the columna. Rosenfeld regards idiopathic perforation as of tropho-neurotic origin, and Barrs has recorded a case of slow, quiet destruction of the septum nasi and hard palate of tabetic origin.

In chronic atrophic rhinitis, as a result of the thinning of the mucous membrane and tissues of the nose, there is a tendency to perforation of the septum, which is increased by the irritation of the crusts in the nostril leading to the finger being introduced.

Symptoms.—In some cases the perforation has caused so little inconvenience that it is only accidentally discovered on making a rhinoscopic examination. Usually, however, the patient complains of irritation and discomfort in the nose, which leads him to scratch the interior. When perforation has occurred, the patient is sometimes annoyed by a whistling sound on

inspiration. A curious case is recorded of a man who had suffered for years from hay fever, but who lost all the symptoms as soon as a perforation occurred in the septum.

As the syphilitic cases usually run a more rapid course and are attended with inflammation, there is more pain than occurs in the non-syphilitic variety, and there is also more discharge. On making a rhinoscopic examination, the so-called idiopathic perforation has thin edges; it is clean cut, and looks as if it had been punched out. It is round or oval in shape, but always regular, and the surrounding mucous membrane is not affected.

Diagnosis.—The chief point in the diagnosis is to distinguish between syphilitic and other perforations of the septum. In syphilis, the ulceration usually begins further back, and involves the vomer itself: it is generally much more extensive, and runs a more rapid course, while it does not possess the characteristic clean cut "button hole" appearance of the other varieties.

When due to lupus, there are usually signs of existing lupus on the face, or the characteristic scars left by this disease, and the edges of the perforation are thick, irregular, and surrounded by hard, pale granulations.

Prognosis.—When once perforation has occurred there is not much chance of the opening closing again; all that can be hoped for is to arrest any further destruction.

Treatment.—If of syphilitic origin, the usual constitutional treatment for this disease should be employed; the nostrils should be kept free from crusts by carefully spraying them out with a warm alkaline or antiseptic solution (formulæ Nos. 51, 52, 53) and ung.

hydr. nit. dil. (1 to 7) should be applied to the margin of the ulceration. Should this not suffice to arrest the ulceration, the surface should be painted with a 20 per cent. solution of cocaine, and the edges cauterised with the solution of the acid nitrate of mercury.

In the idiopathic form, no active measures are desirable, but any accompanying rhinitis should receive appropriate attention, and the ulcerated surface should be anointed with ointment (formulæ Nos. 31, 33, 34). Hutchinson has obtained good results from the repeated careful application of the acid nitrate of mercury and the use of the yellow oxide ointment.

Cement workers, or those engaged in the manufacture of bichromate of potassium, should wear plugs of cotton-wool in the nose while at work, and should be instructed to wash out the nostrils daily with tepid water, and to abstain from picking the nose.

19. NON-MALIGNANT GROWTHS (POLYPI).

Nasal polypi are tumours usually of a soft, jelly-like character growing in the nasal passages.

Ætiology.—There is little doubt that these benign growths are the result of a chronic inflammation of certain portions of the nasal mucous membrane associated with similar changes in the ethmoid bone. Their characteristic features are probably largely due to certain physical conditions under which they grow.

Polypi are comparatively rare under the age of fifteen; a case of congenital polypus has, however, been recorded. They are met with in men more frequently than in women.

Polypi are usually multiple and frequently bilateral. They vary in size from a pea to a mass reaching from the anterior nares to below the level of the uvula and completely occluding the nasal cavity.

These growths frequently hang from their source of origin by a more or less well defined pedicle, but quite as often they grow from a broad base, in fact during the early stages of their growth they are usually sessile, and in this stage are clinically and histologically identical with a localised œdema of the mucous membrane. The pedunculated form, which they later on assume, is possibly due to the action of gravity and the traction exerted upon the growth by inspiratory and expiratory currents of air, especially during the act of "blowing the nose."

Nasal polypi arise invariably from the ethmoidal region, and their bases of attachment can most often be traced to the lips of the hiatus semilunaris, the uncinate process of the ethmoid, and the middle turbinal bone.

A mucous polypus never grows from the inferior turbinal, but in this region moriform hypertrophies (*vide* Hypertrophic Rhinitis) and myxomatous papillomata are by no means uncommon. In long-standing cases, where the whole intra-nasal mucous membrane tends to undergo a polypoid degeneration, papillary growths (not true mucous polypi) may be found growing from the septum.

Histologically nasal polypi consist of a network of connective tissue fibres, in the meshes of which is a mucigenous matrix and connective tissue corpuscles. Fine capillaries traverse the substance of the growth and in many places these are surrounded by small round cells which, taken in conjunction with the nature

of the tissues composing the polypus, point to the inflammatory nature of the neoplasm.

When the polypus is small its surface is covered with ciliated epithelium which, under the influence of pressure or attrition to which the larger growths may be subject, gives place to stratified, non-ciliated cells.

Mucous glands are present in greater or less numbers and cystic degeneration of these may produce cysts of varying size in the substance of the polypus.

Many theories have been invoked to explain the ultimate origin or cause of nasal polypi, but space will only allow of our drawing attention to three of the most important of these. To Woakes must be given the credit of first pointing out the association between nasal polypi and structural changes in the ethmoid bone of a chronic inflammatory type. He regarded the polypus as a "symptom of necrosing inflammation of certain special osseous structures of the nose which is initiated in the muco-periosteal environment of these textures." He designated the condition "necrosing ethmoiditis."

There were few, however, who could confirm his clinical or pathological observations and fewer still who could follow the loose generalisations which he deduced from these.

Gruenwald maintains that suppuration of one or more of the accessory cavities forms the *fons et origo mali*. This is true only in part because many cases of nasal polypi progress for years unassociated with a trace of suppuration.

The pathology of the subject has recently been studied by Lack and we are in entire accord with the observations and deductions he draws from his investigations.

He has shown that in all cases of nasal polypi, definite inflammatory changes are present in the underlying bone.

These changes are of the nature of a rarefying osteitis characterised by the presence of osteoclasts (fig. 24) which produce a gradual absorption of the bone.

He says:—"The changes apparently begin in the



FIG. 24.—A large bay in the bone is seen, and the edge of this is indented, and large osteoclasts occupy the indentations. The bone cells are numerous and larger than normal (Lack). (By permission of proprietors of *Physician and Surgeon*).

periosteum, and in part we see this membrane healthy, and in other parts its deeper layers are very cellular. Where these large cells are seen, little bays appear in the edges of the bone, and around these bays the bone itself seems very cellular. These changes penetrate deeply until the bone becomes disintegrated and breaks up into small fragments which ultimately become absorbed."

It is these fragments of disintegrating bone which can be easily felt with a blunt probe in many cases of nasal polypi, and especially in those where the process is more acute or associated with suppuration. In course of time such wholesale destruction of bone has occurred, that on removal of polypi from the ethmoidal region, the bony structure of the latter has in great part disappeared and its place is taken by a polypoid mucous membrane and other evidence of chronic inflammation, *e.g.*, hyperplasia of connective tissue, thickened mucous membrane, and hypertrophic rhinitis.

That bone disease is the main underlying factor in the causation of nasal polypi is further proved by the well known fact, that removal of a considerable portion of the bone to which a polypus is attached will often entirely prevent recurrence of the growth, whereas removal of the polypus alone almost invariably means one or more recurrences.

As to the cause of the bone inflammation there is still some doubt but it is probably due to attacks of acute rhinitis, from which it does not entirely recover, especially when these are associated with specific poisons, *e.g.*, influenza, the exanthemata, or other pathogenic organisms. In other cases again it may be set up by suppuration of one of the nasal accessory cavities, the origin of which will be discussed later.

Symptoms.—These may be divided into local and general. A sense of stuffiness with more or less nasal obstruction is almost constantly complained of. If the growth is large there may be complete obstruction to nasal respiration, if hanging loosely patients often complain of something “flapping in the nose when they breathe through it.” Excessive secretion is usually present while sneezing fits may or may not

occur. The senses of smell and hearing are generally more or less affected. In old cases of polypus the bridge of the nose may be apparently broadened, this being due rather to venous obstruction in the soft tissues than to displacement of the underlying bony structures.

The voice loses its resonance as in other forms of nasal stenosis, whilst pharyngeal, laryngeal, and bronchial symptoms, the result of constant mouth breathing are often complained of. Among the general or remote symptoms, asthma must be first noted which, as in Voltolini's case, may owe its origin to nasal polypi. Even when not directly due to polypi, asthma is always aggravated by their presence.

The slight deafness, with obstruction, not only to nasal respiration, but to free lymphatic circulation, produces that condition of dulness and apathy known as aprosexia (Guye, *vide* Nasal Stenosis).

Cough, hay fever, epilepsy, giddiness, nightmare, &c., have been met with in patients suffering from polypi and have disappeared after the removal of these growths (see Reflex Nasal Neuroses).

Diagnosis.—Polypi may frequently be recognised without instrumental aid, they may even protrude from the nostrils, in which case they are of a dirty greyish white colour due to the excessive growth of surface epithelium. On anterior rhinoscopy the glistening, blueish-grey or yellowish translucent bodies are seen in the nasal passages, and can be easily indented with a probe without pain. They usually spring from the region of the middle meatus or upper and outer part of the nose. Hypertrophy of the anterior extremity of the inferior turbinal, or prominent anterior septal deviations have been mistaken for polypi, but the

colour, situation, and resistance of the latter should easily demonstrate their true nature. When a polypus has grown backwards towards the naso-pharynx it may be invisible anteriorly and can only be seen by posterior rhinoscopy. Here its blueish-grey translucency should easily differentiate it from the moriform hypertrophies of the inferior turbinate. Malignant growths in the nose are generally more firmly attached than simple polypi, they are also harder, more painful and bleed freely when probed.

Prognosis.—Polypi are not dangerous to life, but that form which is unattended by suppuration is very difficult to eradicate without efficient surgical treatment, although periodical removal of the growths relieves for a long while all symptoms due to their presence. Where they are associated with suppuration of an accessory cavity, the cure of the latter condition and removal of the polypi will nearly always result in a permanent cure.

The possibility of a polypus becoming malignant should be borne in mind, as cases of transformation into sarcoma have been recorded. Such cases are, however, very rare. It must also be remembered that benign and malignant neoplasms may co-exist in the same individual.

Semon's case of unilateral, incomplete Graves' disease, following the removal of nasal polypi, is most instructive as pointing to a danger which had previously not been contemplated as a result of intra-nasal treatment.

Treatment.—The rough and ready method of removal of polypi by means of forceps has almost become a thing of the past, and we mention it only to discourage a procedure which has so little to recommend it. Most

rhinologists use the cold wire snare, a few still employ the galvano-caustic loop.

Whichever plan is adopted, it is essential for the operator to reflect a bright cone of light into the nostril, and to employ a speculum. The interior of the nose should be sprayed with a 5 per cent. solution of cocaine, followed in the course of two or three minutes by a 10 to 15 per cent. solution applied by means of a small wool mop to the growths which require removal. Their bases especially should be well cocainised. In the course of three to five minutes the loop of the snare may be applied. In doing this it is desirable

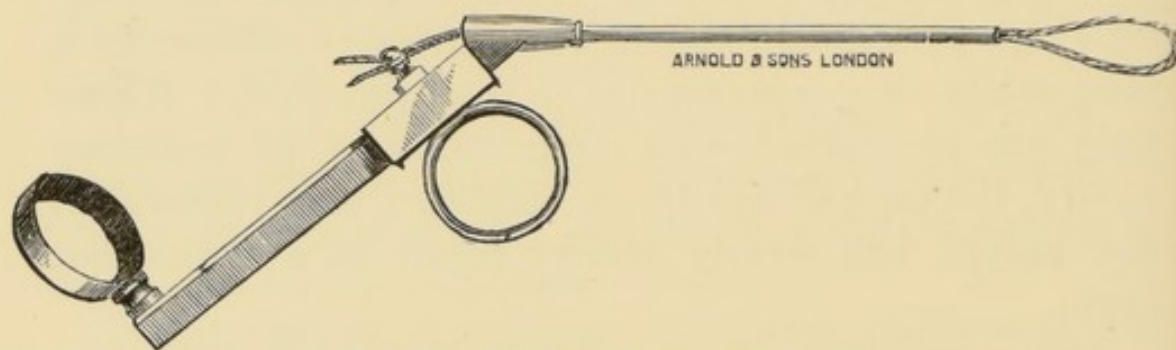


FIG. 25.—Blake's Polypus Snare.

to get as close to the attachment of the pedicle as possible, a manipulation only acquired by considerable practice. The wire is tightened up as far as possible and a combination of very slight traction with a twisting motion easily removes the growth. I, (de H. H.) have always been accustomed to the galvano-caustic loop and find Schech's apparatus the most convenient form. Where a cold snare is employed the simple instrument (fig. 25) is excellent, I (H. T.) have rarely used any other snare, for this has never failed me, even when it has been necessary to cut through portions of the middle or inferior turbinate bones. If stronger or more complicated instruments are desired, Hovell's

modification of Mackenzie's, or Krause's snare are most commonly used. No. 5 or 6 piano wire answers admir-

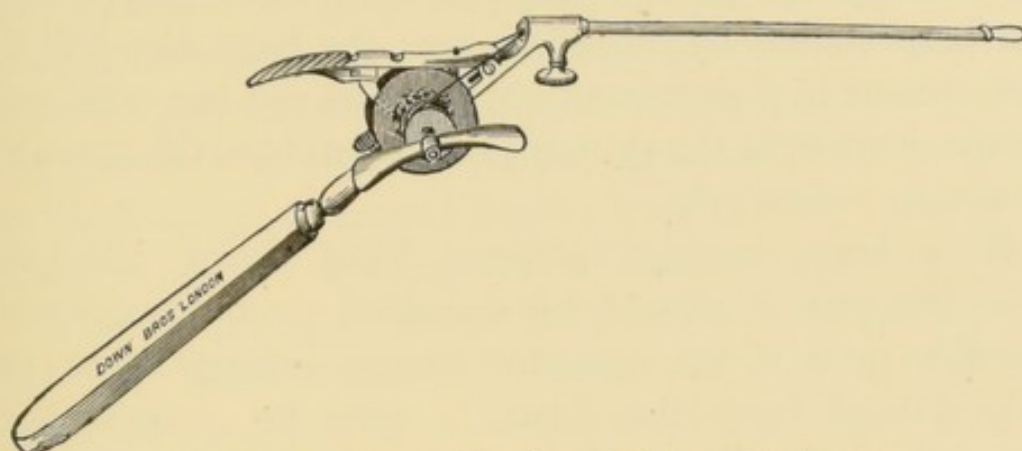


FIG. 26.—Hovell's modification of Mackenzie's Snare.

ably for most snares—it is cheap and possesses the requisite resiliency.



FIG. 27.—Baber's Hook for seizing polypus.

When there is any difficulty in getting the loop over the polypus the latter may be drawn forwards by a

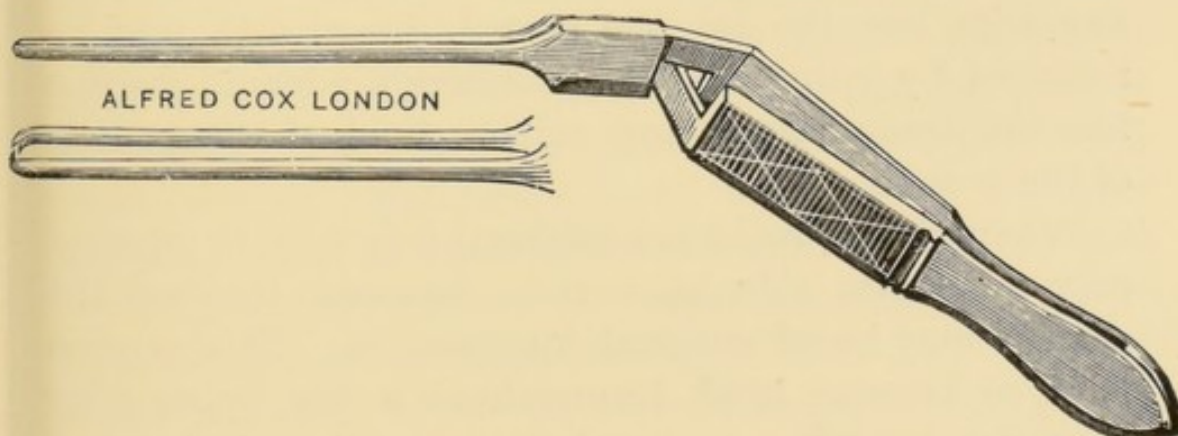


FIG. 28.—Forceps for seizing polypus.

small hook (*e.g.*, Baber's, fig. 27) or forceps (fig. 28) and the wire loop then passed over these instruments, but the need of such aids diminishes rapidly with in-

creased practice and experience on the part of the operator.

In using the galvano-caustic loop for sessile polypi the loop should be passed as near the base as possible; the current is then turned on, and the red-hot wire will form a furrow in the growth, which enables the operator to obtain a firm grip.

If a large mucous polypus hang down into the naso-pharynx it should be cocained as thoroughly as possible, and if the operator cannot engage it in the loop passed from the front, it may be necessary to insert the index-finger of the disengaged hand into the naso-pharynx and so guide the loop over the growth. In other cases the patient can force the polypus into the nostril from the naso-pharynx by a violent and sudden nasal expiration with the opposite nostril occluded—it may then be possible to engage it in the snare. In yet other instances, it will possibly be easier to first push the polypus into the naso-pharynx and then snare it.

In cases of very large polypi completely occluding the naso-pharynx and nose, where it is impossible to pass any wire loop through the nostril, the growth may be removed by introducing Loewenberg's adenoid forceps into the naso-pharynx and seizing hold of the pedicle of the growth.

When the growths are bilateral it is well to operate only upon one side at a time, however tolerant the patient may be of surgical interference. This caution is given because brisk hæmorrhage a few hours after operation has often occurred.

As a general rule, however, the hæmorrhage which follows removal of simple polypi is slight. If it is desired to check it we find that a small pledget of iodoform or salalembroth wool firmly packed against the bleeding

base for a few minutes is nearly always efficient. Should the bleeding recur when the cocaine ischæmia has passed off, then the injection of a hot alkaline douche to which some hazeline or hamamelis has been added is generally effectual in checking the flow. After the removal of several polypi, provided the opposite nostril is clear, a warm alkaline wash is very comforting to the patient in ridding him of excessive mucus, blood clot, &c., and if the douche be used carefully (*vide* p. 42), there is little danger of otitis media being set up. Iodoform can then be insufflated and a small plug of antiseptic wool, constantly renewed, should be worn in the nostril for the first twelve hours or so after removal of the growths.

It must be thoroughly understood that removal of polypi is only the first step in treatment, the difficult task is to prevent their recurrence, and to compass this end the most convenient plan is to burn down the pedicle by means of the galvano-cautery, cocaine having been previously employed to render the part anæsthetic; or caustics, such as chromic acid fused into a bead upon a nasal probe, or 90 per cent. solution of carbolic acid may be applied to the base of the polypus and to the chronic inflammatory tissue in its neighbourhood. Such caustic applications may have to be repeated several times. In cases where the whole middle meatus with the anterior part of the middle turbinal seems to have undergone a polypoid degeneration, nothing conduces so much to the permanent improvement of the case as the removal of the anterior half of that bone, in the manner already described (*vide* p. 32). The surgeon has then free access to the hiatus semilunaris, and for the destruction of small polypoid masses present in this situation he will find Gruenwald's for-

ceps a valuable instrument. When the polypi are associated with chronic empyema of one or more of the nasal accessory cavities, the latter must be dealt with before the chronic inflammatory growths can be cured. As already stated there is undoubtedly some very intimate connection between disease of the ethmoid bone and nasal polypi, and the recognition of this fact has led some surgeons to advocate thorough removal of middle turbinal and the lateral mass of the ethmoid with the aid of curettes and sharp spoons, as a means of dealing with cases of nasal polypi which constantly recur. This radical treatment, as yet in its infancy, is based upon a sound pathological basis and has given excellent results, while it ensures an enormous saving of time to the patient. We consider that it should be reserved for those cases which rapidly recur in spite of the milder methods of treatment by the snare and cautery already laid down, and should then only be carried out by surgeons well acquainted with the anatomy of the parts involved and skilled in the technique and details of intra-nasal surgery.

Apart from measures directed to the treatment of the polypus itself, the associated chronic rhinitis or any other pathological changes should receive attention on the lines already indicated, while the importance of maintaining good general health should always be borne in mind.

We have entirely omitted discussing the value of astringent snuffs, sprays, injections, &c., in the treatment of nasal polypi, because they are of no practical value.

Among the rarer non-malignant growths met with in the nasal fossæ may be mentioned papilloma, hard fibroma, osteoma, enchondroma, angioma, and cysts.

Papillomata.—When recurring within the vestibule these growths have the histological structure of a corn or wart. They are usually pedunculated and can be snipped off with scissors. If they spring from a broader base, a few applications of glacial acetic acid will bring about their disappearance.

Intra-nasal papillomata are confined almost entirely to the inferior turbinal and septum. They may be sessile or pedunculated, with a reddish berry-like surface which easily bleeds. Histologically, Wingrave describes them as papillary myxomata, the digitate processes being covered with a ciliated epithelium. They should be removed by a snare or fine pair of scissors, and their base cauterized by the galvano-cautery. When they are sessile and rapidly recur after removal, the possibility of their malignant nature must be borne in mind.

Fibromata.—According to Bosworth the majority spring from the ethmoidal region of the nose. Increasing nasal stenosis and recurring epistaxis are early, and as a rule constant symptoms, while the rapid growth of the tumour soon causes absorption of the surrounding soft and bony structures producing the characteristic external deformity known as “frog face.” Anterior or posterior rhinoscopy may reveal the growth, the surface of which “is usually irregularly rounded or lobulated, smooth and glistening in appearance and presents a decidedly reddish-pink colour” (Bosworth). If the growth is removed early the prognosis is good, but they are inevitably fatal if allowed to grow unchecked. When possible an endeavour should be made to remove them with a cold wire snare, but where they are very large, producing characteristic deformity, an external operation may be necessary, for details of which the

reader is referred to textbooks of general surgery. In any case the hæmorrhage is often free and troublesome.

Osteomata and Enchondromata.—These are very rare if care is taken not to confuse them with septal spurs and ridges. When large they may produce absorption of the other bony and soft tissues, and produce visible external deformity. Electrolysis, saws or nasal drills may suffice for their removal in early stages, but in their later growth extensive external operations will be necessary.

Angiomata.—The prominent symptoms are bleeding often repeated and copious and gradually increasing nasal obstruction. The growth is usually situated in the upper, anterior part of the septum and has a broad base, with a rounded more or less irregular surface which is elastic to the touch. It has a red, or reddish blue colour and may easily bleed when probed. They are very liable to be confounded with malignant neoplasms. The cold wire loop is said to be safer, simpler and more reliable than the galvano-caustic loop. If the former is tightened up very gradually, one to three hours being necessary, the danger of hæmorrhage is almost obviated.

When small the flat blade or pointed cautery may be used at a dull red heat. Should hæmorrhage occur during the operation or supervene afterwards the nose should be lightly packed with antiseptic gauze, which must be left in position for forty-eight hours before removal.

Cystic tumours.—These are sometimes met with and may arise from cystic degeneration of a mucous gland, or from the same process occurring in a mucous polypus. In the latter instance it is difficult to distin-

guish the cyst from a polypus and it is generally only ascertained when a sudden gush of fluid attends the removal of a supposed polypus, the latter being represented by the shreddy fragments of the cyst wall. Such cysts are rarely multiple, and when carefully removed have not that tendency to recur so characteristic of the common nasal polypus.

20. MALIGNANT GROWTHS.

Malignant disease of the nasal cavities is rare, but cases of epithelioma and sarcoma have been recorded. According to Newman, two-thirds of the carcinomatous tumours are epitheliomata, while the majority of the remaining third are adeno-carcinomata. Sarcomata may be pedunculated from the first but where an epithelioma takes this form it is usually due to malignant transformation of an originally benign growth. Rare, but well authenticated cases of such transition have been recorded.

Symptoms.—The symptoms, which generally first attract attention, are those due to nasal stenosis including alteration of the voice and impairment of the sense of smell. In consequence of the more rapid growth of malignant neoplasms, the obstruction is developed early in the case, and there are often signs of centrifugal pressure—as, for example, broadening of the nose, and pressing upwards of the orbital plate. Pain is usually complained of, and this is increased as the tumour grows and exercises more and more pressure on the neighbouring parts. There may be a discharge of a greenish character from the nose, and this is, at times foetid, more especially perhaps in epitheliomata where

the secretion is also of an acrid nature. Epistaxis is so frequent a symptom that its mere existence in the case of a neoplasm in the nose should suggest the suspicion of malignant disease. These growths vary very much in size; Mackenzie says "from a pea to an orange." Though, as already stated, a sarcoma may be pedunculated, it is usually sessile, of a reddish colour, soft consistence, and very vascular. Epithelioma generally commences as a warty growth which tends to ulcerate early.

Diagnosis.—Rapid growth, acute pain, frequent hæmorrhages, fungating appearance, and friable consistence of the growth, are certain signs of malignancy. Some of these signs, however, may be absent. The point of origin is of assistance, as polypi springing from the septum must be regarded with very grave suspicion. The occurrence of swollen submaxillary glands is an important symptom of epithelioma of the nose, more especially is this the case when the maxillary antrum is involved. Epithelioma of the nose is usually met with in persons of fifty years and upwards. Sarcoma, on the other hand, is most frequent between ten and twenty, and again between forty and fifty, when the greatest number of cases occur.

Osteomata, deviations and perichondritis of the septum, abscess, rhinoliths, and foreign bodies, have all in their turn simulated malignant tumours. In these cases, a careful rhinoscopic examination, and watching the patient will usually suffice to clear up the diagnosis. A gumma which has broken down will, at times, so closely resemble an epithelioma that it will require the effect of treatment to settle the difficulty. The possibility of the existence of a primary syphilitic sore in the nostril should also be borne in mind. Tubercular

lesions are met with as ulcers and granulations. In these cases there may be pulmonary complications. Lupus, if primary, is difficult to distinguish at first; but its very chronic course will finally establish the diagnosis. The same remark holds good of rhinoscleroma.

In all cases, a microscopic examination of a portion of the growth should be made, in order to assist and in some cases clinch the diagnosis.

Prognosis.—This is, in all instances, bad; but some recent cases which have been operated on go to show that sarcoma of the nose is not so malignant as is generally believed. Then again the malignancy of sarcomata varies with their histological structure, *e.g.*, those in which there is a preponderance of fibrous tissue are less malignant than others in which the cell elements are in abundance, and hence the value of a microscopic examination of a portion of the growth from a prognostic point of view.

The average duration of cases of epithelioma of the nose is two years, and death comes on, at latest, three years from the commencement of the disease, and is brought about by meningitis or cachexy.

Treatment.—If the tumour be pedunculated and its attachment can be ascertained by anterior rhinoscopy an attempt should be made to remove it by means of the cold wire snare passed through the anterior nares. Under other circumstances an external operation will probably be necessary, *e.g.*, Rouge's, Ollier's, &c. In this way the origin of the growth may be brought into full view and, with the hæmorrhage, which is always very free, efficiently dealt with. Sessile tumours, with limited base of implantation, offer a fair chance of removal; but if the tumour spreads widely or deeply,

the question as to whether any operative procedure is advisable requires the gravest consideration, as a partial removal of the growth would only aggravate the evil. If the tumour be inoperable, the best plan of arresting repeated hæmorrhages is the use of the galvano-cautery or electrolysis. If the latter be employed, the positive pole should always be intra-nasal.

21. TUBERCULOSIS OF THE NOSE.

Though tuberculous disease of the pituitary mucous membrane, in comparison with the similar affection of the oro-pharyngeal cavity, is a rare disease, it is found to occur more frequently than was at one time believed to be the case.

Ætiology.—The disease almost invariably occurs in patients suffering from pulmonary or general tuberculosis, but exceptional cases have been described, in which no pulmonary or other tuberculous lesion was recognised.

Morbid Anatomy and Pathology.—Chronic catarrh and repeated irritation of the nasal mucous membrane, by causing abrasions of the epithelium, may afford entrance to the tubercle bacilli, which will multiply and give rise to the characteristic lesion if the soil be suitable. Tuberculosis occurs in the nose, either in the form of ulceration or as a growth. The usual site of the ulcer is the septum, about half an inch from the anterior border, but the ala nasi and floor of the nostril are also attacked. The ulcer has sometimes thickened, everted edges, but is usually superficial. The surface of the ulceration, which is of a greyish-red colour, is covered by a muco-purulent secretion, or by crusts.

Around the ulcer may sometimes be seen small yellow specks, indicating the deposition of miliary tubercle; these spots soften, break down, and, by coalescing, increase the size of the original ulcer. Tubercle bacilli can be found in the secretion or deep scrapings of the ulcer. If a growth occurs, it is generally seen on one of the turbinals, and it resembles a papillomatous growth, but is smaller, more flattened, of a more regular outline, and of a reddish-grey colour (Bosworth).

Symptoms.—A slight muco-purulent and occasionally blood-tinged secretion, or a tendency to scab formation, may be the only symptoms complained of. Tuberculous disease of the nose represents a much more chronic affection than a similar condition of the pharynx or larynx, inasmuch as the nose is not subjected to the constant movement and other sources of irritation to which the latter are exposed.

Diagnosis.—There is considerable difficulty in making a differential diagnosis between lupus and tuberculosis of the nasal mucous membrane; most authorities, indeed, regard them as manifestations of the same condition, but differing in their chronicity and mode of growth.

As regards the diagnosis of tuberculosis from syphilis, the non-occurrence of tubercle bacilli should lead to the employment of an anti-syphilitic treatment; and only if this fails should the question of tuberculosis be considered.

Prognosis.—If the ulceration is limited in extent, and is not running a rapid course, it may be possible to arrest the disease, and especially if there be no active pulmonary tuberculosis.

Treatment.—For small ulcers, Cartaz recommends the galvano-cautery under cocaine anæsthesia. For

more extensive ulceration, lactic or pyrogallie acid, with thorough previous scraping, should be employed. If operative treatment is contra-indicated, the surface of the ulcer should be cleansed with an alkaline spray, iodoform should then be insufflated, and a pledget of cotton-wool introduced into the nostril, or a 5 per cent. solution of menthol in liquid paraffin applied. The usual treatment, hygienic and medical, appropriate to tuberculosis, should be carried out at the same time.

22. LUPUS OF THE NASAL MUCOUS MEMBRANE.

Ætiology.—Lupus of the interior of the nose usually results from extension of the disease from the face.

Cozzolino has, however, described five cases of primary lupus of the nose occurring in patients from twenty-two to fifty-five years of age. A history of tuberculosis, either in the individual or his family, is usually to be elicited in cases of nasal lupus.

Morbid Anatomy and Pathology.—Lupus of the nose may occur in the form of ulceration, which often leads to perforation of the septum, or as tumours. Ulceration usually begins just within the nostril, and soon leads to perforation of the septum. The ulcer may heal, or it may extend up to the edge of the vomer. As in other parts of the body it may show a tendency to heal at one point while spreading in another. The lateral cartilages for the most part remain free; the turbinates, however, are usually attacked. The nodules seen in the nostrils resemble those met with on other mucous surfaces.

Symptoms.—The chief symptom of which the pa-

tient complains is the discomfort produced by the blocking of the nose, which is aggravated by the tendency there is in these cases to the formation of crusts. There is but little discharge, and this is usually free from odour.

Diagnosis.—The perforating lupoid ulcer of the septum is often mistaken for a syphilitic affection. The latter usually spreads to the bony septum, and is accompanied by a profuse foetid discharge, whereas lupus generally spares bones and the discharge is very slight. The absence of response to anti-syphilitic treatment will assist in excluding syphilis. Lupoid tumours of the nose have also to be distinguished from malignant or other tuberculous lesions in which case a microscopic examination of the morbid tissues should be made and the giant cells of lupus looked for. The diagnosis of nasal lupus is sometimes confirmed by the appearance of lupus nodules on the skin.

Prognosis.—Lupus of the nose generally runs a chronic course. It may extend to the sphenoid and cause death from meningitis. It is, however, very amenable to efficient treatment.

Treatment.—The best results are obtained by thoroughly scraping away the diseased tissue by means of a sharp spoon. When the slight hæmorrhage has been checked, a solution of lactic acid 80 per cent. should be well rubbed in. Trichloracetic acid and the application of the galvano-cautery after curetting have also been recommended. These measures are of course carried out under general anæsthesia. Cod-liver oil, syrup of the iodide of iron, and more especially arsenic, should be given internally.

23. SYPHILIS OF THE NOSE.

All stages of syphilis are met with in the nasal cavities, *i.e.*, primary, secondary, tertiary, and inherited syphilis. Primary syphilitic infection of the nostril is very rare; nevertheless, twenty-seven cases have been recorded. As a rule the virus is accidentally conveyed to the nose by the finger, but cases of direct transference by the genital organ have been noted. Examples of the former have been recorded by Spencer Watson and Moure (Bordeaux).

In the absence of history, the diagnosis of the nature of the disease would be attended with great difficulty until the supervention of secondary symptoms clears up its nature. It is most likely to be confounded with sarcoma, as this is the commonest malignant growth in the nose; but from this it may be distinguished by its tendency to bleed, the small amount of swelling compared with the ulceration, and the early enlargement of the sub-maxillary glands. Compared with the extreme frequency of mucous patches in the mouth, secondary syphilitic manifestations are very rarely met with in the nose, and when they do occur they are chiefly seen at the orifice. A catarrhal, erythematous, papular, or pustular condition of the mucous membrane is met with under these circumstances. Tertiary syphilitic affections of the nose are of frequent occurrence. They may take the form of gumma, ulceration or of necrosis of bone and cartilage.

Gummata are usually situated on the septum, but they may occur on the floor or external wall of the nose. They are seen as smooth, rounded tumours of a purplish colour and may be mistaken for a deviated

septum, but unlike the latter condition there is no corresponding concavity on the opposite side of the septum. Nasal obstruction and pain increasing towards night are the symptoms most observed by the patient. The situation and immobility of gummata distinguish them from sarcomatous growths (*vide* Malignant Growths of Nose). They may remain *in statu quo* for some months, or softening may occur and the gumma breaks down producing ulceration which may penetrate to the deeper tissues, and give rise to necrosis of bone or cartilage. Under such circumstances there is a discharge of horribly offensive pus, dried crusts, and necrotic tissue of characteristic but indescribable odour. If the gummatous deposit occurs in the lower part of the septum, ulceration may take place into the hard palate, and through the perforation thus produced a probe will detect bare bone, corresponding to the lower border of the vomer, which may possibly form a sequestrum. If the anterior portion of the septal cartilage is destroyed, flattening of the tip of the nose is produced, which is not the case with a central perforation as we have already pointed out (*vide* Perforation of Septum).

When the nasal bones and upper part of the vomer are the seat of disease, then the saddle-back deformity is produced, a condition which is also aided by the cicatricial contraction of the connective tissue which binds the cutaneous and cartilaginous structures to the nasal bones. In other instances large portions of the cartilaginous and bony septum may be destroyed without producing any visible external deformity.

In advanced cases of tertiary syphilis of the nose exposed areas of bone or loose sequestra can often be easily made out with a probe.

Statistics show that the danger of the nose and nasopharynx becoming attacked is greatest during the period of one to three years after infection.

Inherited or Congenital Syphilis.—One of the earliest manifestations of inherited syphilis is snuffles, a term applied to the nasal catarrh so characteristic of this form of the disease in infants. It may be present practically at birth, or supervene within the first few weeks of life.

At first merely a coryza, the secretion soon becomes muco-purulent and irritating, producing soreness of the nostrils, while nasal breathing, so natural to a child, is rendered almost impossible and nursing at the breast has to give way in many instances to spoon feeding.

Coincident with, or rapidly following, the nasal discharge are the various skin eruptions, *e.g.*, diffuse erythema, papular eruptions of the buttocks or soles of the feet, mucous tubercles of the anus, mouth, &c.

These, taken in conjunction with the wizened features and other evidences of malnutrition, render the diagnosis as a rule easy.

If the patient is not quickly placed under treatment, ulceration of the nasal membranes quickly supervenes, and spreading to cartilage and bone leads eventually by their destruction to the hideous disfigurement seen in the bridgeless noses of congenital syphilis. Later in life, especially at or after the period of puberty, the question of inherited syphilis may again crop up, in connection with the changes that have taken place in the nostrils leading to the falling in of the bridge of the nose.

Prognosis.—Syphilitic affections of the nose whether congenital, primary, secondary, or tertiary, respond readily to appropriate treatment, on the other hand, if

allowed to take their course, the disfigurements already noted will frequently ensue.

Treatment—Congenital Syphilis.—Mercury in the form of grey powder should be given in one grain doses, twice daily, the effect on the bowels being watched. Where the mercury is ill borne inunctions of blue ointment should be substituted; ten to twenty grains mixed with an equal quantity of lard should be spread on a flannel and wrapped round the child's waist every night. The treatment should be continued with few remissions for at least six months, during which time great care must be maintained in keeping the child free from colds and thoroughly well nourished, the latter being often difficult at the outset, because of the spoon feeding necessitated by nasal obstruction.

Locally the nose should be cleansed by frequent short applications to the nostrils of a warm alkaline spray, while the patency of the nasal passages may be enhanced, especially previous to taking food, by dropping into them two or three minims of a four per cent. solution of cocaine dissolved in olive or castor oil.

In the primary and secondary stages of the acquired disease mercury internally will produce its usual rapid and good results. The nostrils may be sprayed with a simple cleansing or antiseptic solution (formulæ Nos. 51, 52) and dilute citrine ointment (formula No. 34) may be applied, or insufflations of iodoform or iodol may be used.

With tertiary manifestations iodide of potassium alone or in combination with mercury gives, as a rule, excellent results. The iodide should be prescribed in doses varying from five to twenty grains thrice daily after food.

Inunction of mercury ointment will sometimes produce striking results, when its internal administration with iodide of potassium seems to have reached the limit of efficiency. The nostrils should be frequently cleansed with an alkaline wash, to which an addition of sanitas or listerine will be valuable in overcoming the stench, which is usual when necrosed bone is present. Insufflation of iodoform or iodol will assist towards the same end. Endeavour should be made to remove loose sequestra by means of suitable hooks or nasal forceps. If such are situated in the upper nasal regions no force must be used in their extraction. Occasionally the sequestra may be too large to pass the anterior nares, in such cases they may first be broken into smaller fragments and then the portions removed separately, or it may even be necessary to turn up the upper lip (modified Rouge's operation) and thus gain access to the nose through the larger opening thus afforded.

24. RHINOSCLEROMA.

This is an exceedingly rare disease. The majority of cases have occurred in the eastern parts of Austria and the south-western provinces of Russia. It has also been met with in Central America, Egypt, and India. At the Pathological Society, Oct. 21, 1884, Payne and Semon exhibited the first case described in this country.

Wolkowitsch's statistics compiled from an analysis of eighty-five cases, show the frequency with which different regions were attacked. Mucous membrane of nares 81, cutaneous coverings of the nose 74, pharynx 57, upper lip 46, larynx 19, hard palate 17, upper jaw

16, trachea 5, tongue 4, lachrymal tract 5, lower lip 2, and the ear 1. Young adults are chiefly attacked.

Morbid Anatomy and Pathology.—The disease may be regarded as an infectious chronic granuloma, consisting of an infiltration of spindle and round cells, smaller than granulation cells. Together with these, there are some larger cells of a different form. The infiltration takes place into the skin and upper part of the mucous membrane, and gives rise to a cartilaginous hardness. The “creeping” tendency of the new growth is very striking. Characteristic micro-organisms have been found by Cornil and Frisch in the larger cells, the lymphatics, and blood-vessels of the patches. They are very similar to Friedlaender’s pneumococcus and can be stained by Gram’s method. Inoculation experiments have been hitherto unsuccessful, though Secretan has reported two cases, one of which conveyed the disease to the other.

Symptoms.—As the disease appears purely a local one, the symptoms are limited to the organ affected. When it attacks the nose, it may go on to produce complete obstruction. On making an examination, the neoplasm is seen to occur in slightly elevated plates, red in colour, smooth on the surface, of firm consistence, and as hard as cartilage. There may be some discharge, and even hæmorrhage, from the nose; but there is an absence of anything like œdema or inflammation, and there is no tendency to ulceration or softening. Although there is usually some tenderness on pressure, the affection is practically a painless one. If the disease attacks other parts, changes similar to those met with in the nose are seen. If the pharynx or larynx is much affected, there may be marked dyspnœa.

Diagnosis.—The diseases from which rhinoscleroma

requires to be differentiated are syphilis, lupus, tuberculosis, malignant disease, and keloid.

From all these, except keloid, rhinoscleroma is to be distinguished by its slow progress, the absence of ulceration and offensive discharge, and the presence of typical micro-organisms. As against syphilis, the diagnosis will be confirmed by the want of response to energetic anti-syphilitic treatment. Relapses, which are so common in lupus, do not occur in rhinoscleroma. Moreover, in the former disease, there is usually some cutaneous complication. The pain, rapid growth, and foul discharge accompanying malignant disease of the nose, will suffice to exclude it. Time will be necessary to distinguish keloid from rhinoscleroma.

Prognosis.—The course of the disease is exceedingly chronic, and cases are recorded as having lasted upwards of twenty years. Unless it extends down the larynx, there is no danger to life. It seems probable that some of the cases described as chorditis vocalis inferior hypertrophica were in reality examples of rhinoscleroma attacking the larynx. As a result of the infiltration of the laryngeal mucous membrane, a kind of cicatricial contraction may take place, which requires either mechanical dilatation or tracheotomy.

Treatment.—All that should be attempted in cases of rhinoscleroma is to maintain the patency of the nose and larynx, should this be threatened. In the nose, the galvano-cautery has been employed with partial success, and the like result has attended extirpation with the knife. Good results have also been reported from injection into the diseased areas of one to twelve per cent. solutions of arsenic, two per cent. solution of carbolic acid and ten per cent. solution of zinc chloride. These may have to be made many times.

25. RHINOLITHS.

Nasal Calculi.

Ætiology.—The term rhinolith is used to imply a nasal concretion formed by a deposit of certain salts contained in the nasal secretion, around a nucleus which most often consists of a foreign body and less commonly a blood-clot or even mucus. In the latter case if the rhinolith be of long standing no nucleus may be visible when the calculus is examined. The foreign body may be introduced through the anterior nasal opening, as is so often the case with children, or it may gain access to the nasal cavities during a fit of sneezing or vomiting. Altered nasal secretions accompanying chronic inflammation of the nasal mucous membrane, coupled with any conditions leading to the retention of such secretions, are probably causes which promote the formation of rhinoliths.

Seeligmann's statistics show the greater liability of females to the affection than males. Rhinoliths usually occupy the inferior meatus, but they may be met with in any part of the nasal passages.

They are almost invariably single and occur on one side of the nose only. In weight they average from seven to ninety grains; but one weighing 720 grains has been recorded (Hendley). In colour, they vary from a dirty white to grey, brown, or black. In consistence they may be soft and crumbling, or as hard as ivory. Chemically, rhinoliths are usually composed chiefly of phosphates and carbonates of calcium and magnesium with traces of chloride and carbonate of sodium, and a certain proportion of organic matter.

Symptoms.—An unilateral, muco-purulent, foetid or non-foetid discharge, associated with symptoms of nasal obstruction are the two commonest symptoms. In exceptional cases, where the septum has become perforated there may be a discharge from both nostrils. In consequence of the irritation produced by the presence of the stone there may be pain, radiating from the nose, and considerable swelling of the part, while sympathetic disturbances of the eye and ear may express themselves in lachrymation, earache, tinnitus, &c. A nasal twang to the voice and attacks of sneezing, giddiness, and headache may also be complained of. Unilateral hyperidrosis of the face has been noted.

Diagnosis.—The nostrils should be first cleansed with an alkaline solution and then sprayed with a ten per cent. solution of cocaine. Careful anterior rhinoscopic examination and the use of a probe, combined with due attention to the history of the case, will generally enable a diagnosis to be made, which will eliminate ozæna, nasal polypus or tumour, and disease of the bones.

Prognosis.—A favourable opinion can be given in these cases, as when once the stone has been removed the symptoms speedily disappear.

Treatment.—The removal of a rhinolith can generally be brought about by means of suitable nasal forceps, or by means of a loop of wire passed over the concretion. If the surgeon fails to extract the concretion anteriorly, it is inadvisable to push the obstruction backwards into the naso-pharynx, unless the index finger is passed into that space to prevent the foreign body falling into the larynx. Under such circumstances Sajous advises that an instrument, similar in principle to Bellocq's sound, be passed through the nose, a piece

of lint fixed to the end projecting into the pharynx, and then forcible withdrawal of the lint through the nostril in order to impel the rhinolith forward, so that it can be removed with forceps. If the calculus be very large it can first be crushed with strong forceps and the fragments picked out separately. These procedures should, whenever possible, be carried out under cocaine anæsthesia; because under such circumstances the posture and assistance of the patient are of great help to the operator. Under certain circumstances, *e.g.*, very nervous individuals, or when the inflammation around the rhinolith is great, a general anæsthetic may be necessary. The after-treatment consists in spraying the nostril with some mild antiseptic solution, such as formulæ Nos. 51 and 52.

26. FOREIGN BODIES IN THE NOSE.

All kinds of foreign bodies have been met with in the nose; especially frequent are those which form objects of interest to children, *e.g.*, buttons, beads, &c. Usually they are passed into the nose by the patient, but occasionally they gain access during vomiting, &c. (*vide* Rhinoliths). Lodging generally between the inferior turbinate and the septum, the mucous membrane soon becomes tolerant of the foreign body, so that it may remain in the nose unsuspected for many years.

Symptoms.—These have been fully discussed in the last section dealing with rhinoliths, but we would emphatically remind the student that a unilateral purulent nasal discharge, occurring in children is strongly suspicious of a foreign body.

Diagnosis.—Inasmuch as a rhinolith is a foreign body, what has been said of the diagnosis of rhinoliths will equally apply to that of foreign bodies in general. The eruption of a supernumerary tooth into the nasal cavity is not a very uncommon event, and the possibility of its occurrence should always be borne in mind. Sometimes a foreign body is surrounded by prominent granulations, but a probe passed gently between these will usually strike and reveal its presence.

Treatment.—An attempt should be made, in the first instance, to drive out the foreign body by one of the pneumatic methods. They are most useful when the foreign body has only recently gained access to the nose and has not set up inflammatory changes.

A simple method is to make the patient sneeze by tickling the inside of the sound nostril or inhaling a pinch of snuff; during the act of sneezing the unoccluded nostril should be firmly closed by the finger, so that the full blast of air passes down the occluded nostril. In another case the patient is told to tightly close the lips, and inflate the cheeks with air, while a Politzer bag is applied to the free nostril and suddenly compressed. The blast of air will often drive the foreign body from the occluded nostril. The same method can be applied to a crying or screaming child.

In the absence of a Politzer bag, a piece of rubber tubing will suffice, one end being passed into the free nostril of the patient while the physician forcibly blows into the other. Failing in these methods a 10 to 15 per cent. cocaine solution may be sprayed into the nostrils and an endeavour made to seize the foreign body with forceps, scoop, loop of wire, curved probe, strabismus hook, &c. In young children a general anæsthetic is usually necessary. Finally we do not

advise syringing lotions into the unobstructed nostril, for the danger of the fluid passing into the tympanum and producing inflammation is a real one. (See also Treatment of Rhinoliths).

27. MAGGOTS IN THE NOSE.

Inasmuch as we do not know of any case occurring in the British Isles in which maggots have been found in the nostrils, it suffices to say that myiasis is seldom met with outside the tropics.

As regards treatment, inhalations of chloroform will sometimes effect a cure; if not, the patient should be rendered anæsthetic with this drug, and equal parts of chloroform and water, or even pure chloroform, may be injected up the nostrils. Injections of kerosene have been found useful. Morell Mackenzie's article on the subject is one of the most complete of those contained in his admirable treatise. For further information, the reader is referred to this article in his treatise on "Diseases of the Nose and Throat."

28. EPISTAXIS.

By epistaxis is understood bleeding from the nose.

Ætiology.—Mechanical violence is the most common of all causes of nose bleeding. In acute and chronic hypertrophic rhinitis, and again in vaso-motor rhinitis, the nasal secretions may be tinged or streaked with blood, an occurrence to which the term epistaxis, as ordinarily understood can scarcely be applied. A freer

flow oftentimes occurs when the crusts of atrophic rhinitis are forcibly removed.

Polypi and papillomata rarely, syphilis and tubercle somewhat more frequently, are accompanied by a blood-stained discharge, while epistaxis is a frequent symptom of malignant disease and angiomata. Leeches sometimes enter the nostrils and may give rise to severe hæmorrhage.

Of constitutional causes, increased arterial tension with cardiac hypertrophy, as seen in contracted granular kidney, explains the frequency of epistaxis in this disease, while the same symptom is not infrequently met with in valvular disease of the heart, especially mitral stenosis and aortic regurgitation, also in bronchitis and emphysema. It may also be an early or late symptom in pneumonia, and often occurs in the paroxysms of whooping cough. Cirrhosis of the liver has long been regarded as a cause of epistaxis.

Direct pressure upon the veins of the neck, as in cases of bronchocele and other tumours of the neck, may cause epistaxis.

Rarefied air, as in mountaineering and ballooning, extremes of heat and cold, or sudden change from one to the other will produce epistaxis.

In diseases attended with alterations in the composition of the blood, epistaxis is a prominent symptom. It is met with in hæmophilia, purpura, scurvy, chlorosis, anæmia, pernicious anæmia, and ague, in which latter case it may be the sole periodical symptom of the effect of malarial poisoning.

Certain drugs, such as phosphorus, the salicyl compounds, chloralamide, &c., have been known to cause epistaxis. This symptom may also occur as one of the prodromata, or during the continuance of all the acute

infective diseases, notably enteric fever. Some epidemics of influenza seemed to have developed a special hæmorrhagic tendency during the course of the disease. In relapsing fever, according to the observations of Semon, epistaxis was a critical symptom in more than 30 per cent. of the cases. Epistaxis may be one of the earliest signs of leprosy.

Epistaxis is rare in the newly-born and infants, but from the second year of life up to the period of puberty it is more and more frequently observed. In adult life it becomes rare, but the tendency may again manifest itself in old age.

Males are more prone to it than females. Joal's observations show the influence of masturbation and the importance of the sexual factor in the coming on of epistaxis in young people.

That epistaxis may replace the catamenial flow in rare cases is, we think, proved by sufficient clinical evidence. Baumgarten points out that such cases occur almost exclusively at the period of puberty, at the menopause and, in rare instances, during pregnancy.

The immediate exciting cause of the flow may be sneezing, blowing the nose, forcible expiratory efforts or slight mechanical injuries as in picking the nose. The attacks may, however, occur spontaneously or even during sleep.

Morbid Anatomy and Pathology.—In the great majority of cases the blood can be seen to issue from a spot on the anterior part of the septum, which is known as the "*site of predilection*" for nasal hæmorrhage. This spot is usually at the distance of about half an inch from the anterior end of the cartilaginous septum, and corresponds to the situation of the organ of Jacobson. The small vessel supplying the blood is a terminal

branch of the anterior artery of the septum, itself a branch of the internal maxillary artery. Rarely the hæmorrhage comes from other intra-nasal regions, *e.g.*, the anterior end of the inferior turbinate. The appearances presented by the "site of predilection" vary considerably. In some cases a varicose or aneurysmal condition of the vessels on the septum may be distinctly recognised; in others, a small patch of erosion or ulceration, the size of a poppy or hemp seed to a lentil, may be seen. Sometimes the mucous membrane is soft, spongy, and slightly elevated; at others, the spot looks pale and atrophied; occasionally, the only change to be distinguished is a slight alteration in polish and colour. Whatever may be the local condition, a characteristic symptom is, that on gently rubbing the part with a smooth probe, it bleeds. As the result of a previous hæmorrhage, the spot is usually covered with a brown or black crust; or a minute black dot may alone represent the weak spot in the vessel wall from which the blood escaped.

In exceptional cases a free flow of blood may occur from the inferior turbinate, from veins in the posterior part of the nose, or from an artery on the floor anteriorly. Kelly has recently drawn attention to a hitherto unrecognised source of epistaxis which is generally very free and alarming. The hæmorrhage is venous and its source is the anterior ethmoidal veins which anastomose with the veins of the dura mater and with the longitudinal sinus—one of these veins accompanies the anterior ethmoidal artery and opens into the longitudinal sinus. As the pressure in the latter closely follows the general circulatory pressure (L. Hill) it would be easy for free bleeding to emanate from a ruptured ethmoidal vein.

Symptoms.—The mode in which the hæmorrhage

occurs varies very greatly. In some cases, it may come on daily for a number of weeks: the bleeding then ceases entirely for a considerable time. In another series of cases, there may be frequent, even daily, attacks of slight hæmorrhage, this condition lasting for years; or the attacks may occur at infrequent intervals, but then generally very severely. The flow of blood usually lasts only a few minutes, but it may sometimes continue with more or less intensity for hours. The quantity of blood lost varies very greatly, from a few drops up to twelve pounds in sixty hours. Epistaxis is sometimes preceded by headache; in other cases, especially when the flow has been excessive, headache may follow the attack. In some rare cases, an attack of migraine is cut short by the onset of epistaxis.

Diagnosis.—Epistaxis has to be distinguished from cases in which the blood does not come from the nasal mucous membrane, but from some other organ, the nose representing merely the passive part of a conduit. Under this category are comprised bleeding from the pharynx, naso-pharynx, the accessory cavities of the nose, larynx, lungs, and stomach, and cases of fractured base of the skull. In all these instances, blood will come from both nostrils, unless there is any narrowing or occlusion of one nostril, with the exception of cases in which the hæmorrhage results from a cavity directly communicating with one nostril, and then, of course, the bleeding will be on the affected side only. On the other hand, it must be remembered that in cases of true epistaxis the blood may trickle down the throat and be swallowed, finally to be vomited up, simulating hæmatemesis. Epistaxis may also be mistaken for hæmoptysis, if in a posterior nasal lesion the blood should trickle backwards and be coughed up. Anterior

and posterior rhinoscopy, carefully carried out, will almost invariably suffice to clear up the diagnosis; in exceptional cases in which this aid fails, there are usually some collateral symptoms which will prevent a mistake being made.

Prognosis.—Generally speaking epistaxis tends to cease spontaneously. In nasal diseases, with the exception of malignant new formations, a good prognosis may be given. Where the hæmorrhage is due to congestion, the combination of local and general treatment will almost invariably effect a cure. When, however, we have to deal with degenerative changes in the vessels, or with diathetic diseases, the prognosis is bad, and death may be directly due to the loss of blood.

In cases of granular contracted kidney and hypertrophy of the heart, the occurrence of epistaxis should warn the physician of the possible supervention of cerebral hæmorrhage or uræmic convulsions. Epistaxis in old people with degenerative vessels also requires a guarded prognosis. If the flow of blood from the nose be too promptly arrested, one of the cerebral vessels may be the next to give way, so that in these cases attention should be directed to the state of the bowels, and if the patient be at all plethoric, his diet should be carefully regulated.

In the presence of head symptoms, the history of epistaxis is in favour of cerebral hæmorrhage, as it is not uncommon to find epistaxis preceding a fatal attack of sanguineous apoplexy.

Treatment.—In young people epistaxis may relieve undue plethora and, therefore, may be considered salutary, if not persistent or of too frequent recurrence. The patient should sit quietly in an easy chair so that

the blood may trickle forwards from the nose while the neck is freed from any constriction, *e.g.*, tight collars, &c. If it is considered wise to check the hæmorrhage, the arms may be raised above the head, an ice-bag or cold cloths applied to the nape of the neck and to the nose while the feet are placed in water as hot as can be borne. Failing in these methods the nose should be examined, and if the bleeding comes from the usual spot, a small dossil of lint or wool, preferably soaked in tincture of hamamelis, or in a ten per cent. solution of antipyrine in hazeline, should be introduced into the nostril, and pressure on the ala applied from without and maintained for three to five minutes. This treatment will be successful in a great number of cases. Five grains of suprarenal extract dissolved in a drachm of water and applied on wool to the bleeding point has been credited with valuable hæmostatic effect. If the hæmorrhage frequently recurs, the galvano-cautery at a red heat, chromic acid, or nitrate of silver applied to the bleeding spot, after it has been cocainised, will usually effect a radical cure. To the small eschar produced some carbolised vaseline should be applied for a few days. If, however, it is found that the hæmorrhage does not arise from the "site of predilection" it should be borne in mind that the blood may be coming from a ruptured anterior ethmoidal vein; as a rule it can be immediately checked by packing a strip of gauze between the middle turbinate and the septum.

In the very great majority of cases the means already cited will check hæmorrhage from the nose. Should the surgeon be unable to satisfy himself that the blood is coming from either of the situations mentioned, recourse may be had to syringing the nostrils with hot water (120° F.) to which tincture of hamamelis can advanta-

geously be added. Ice-cold sprays have also been recommended.

There are few more efficient and painless methods of checking intra-nasal hæmorrhage, whether due to genuine epistaxis or resulting from operative interference, than the use of Cooper Rose's inflating plug (fig. 29).

It consists of an india-rubber bag connected with a tube, which is provided with a stopcock. The bag is introduced into the nostril in a flaccid state, and then

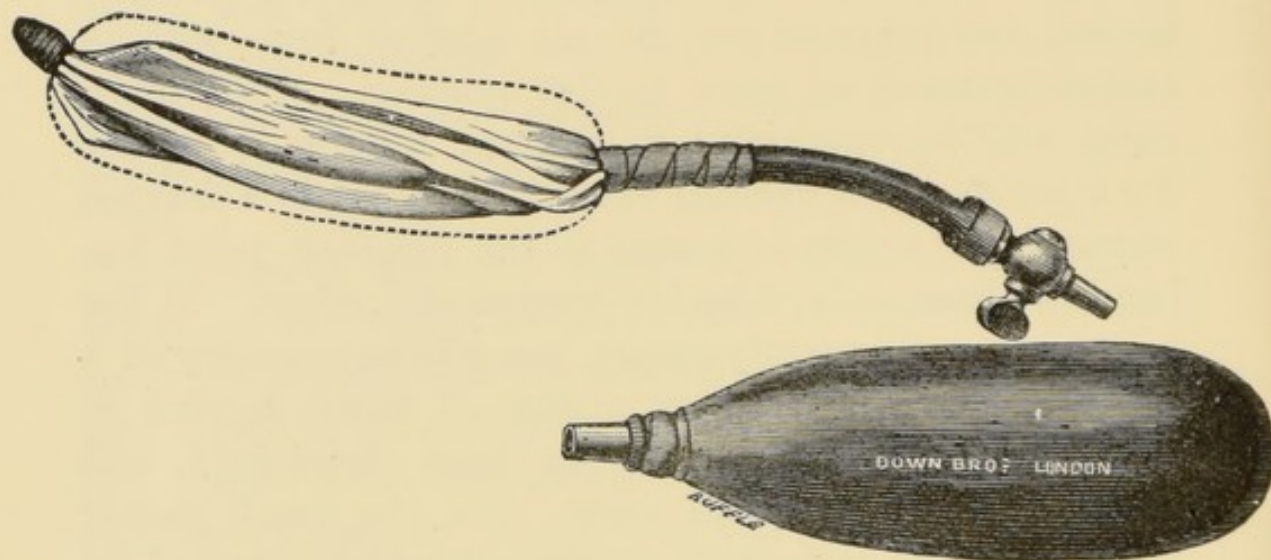


FIG. 29.—Cooper Rose's Inflating Plug.

distended by blowing it up through the tube. It should be left *in situ* from four to twelve hours in severe cases of epistaxis. Its removal is painless and is rarely followed by return of hæmorrhage, which cannot be said of gauze plugs, the extraction of which is often as painful as their insertion. A condom attached to the end of a gum elastic catheter four inches long, to which is fastened a piece of india-rubber tubing provided with an ordinary clamp, has been proposed as a substitute for Cooper Rose's apparatus.

Where all other means fail to arrest epistaxis it has been advised by some to plug the nose anteriorly and posteriorly. The best instrument for carrying out the posterior tamponade is Bellocq's canula (fig. 30). The canula, which contains a watch spring fixed to a stylet, is passed into the nostril. By turning a screw, the watch spring runs down the canula and protrudes into the mouth. The piece of string, which is tied to the extremity of the spring, can be attached to a pledget of antiseptic gauze, of sufficient size to occlude the posterior nares, care of course being taken to have a second string fastened to the pledget and coming out

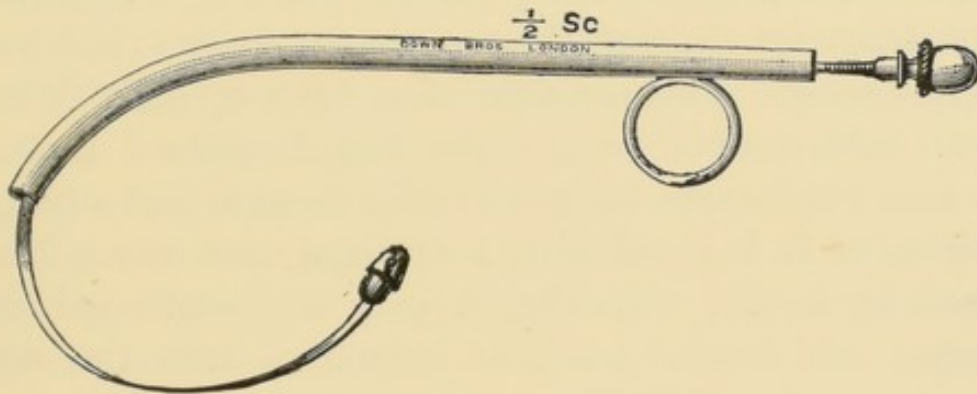


FIG. 30.—Bellocq's Canula.

through the mouth, by means of which, when the time comes, the plug may be pulled back into the mouth and thus removed. It is a convenient plan to tie together the ends of the strings coming through the mouth and nostril respectively. After the posterior plug has been fixed, the nostril should be plugged anteriorly. It is not advisable to leave the plug in the nostril more than forty-eight hours. If any difficulty is experienced in withdrawing it, the best plan is to irrigate the nostril with a saline antiseptic solution, such as formula No. 52. After the plug is removed, the nasal cavity should be cleansed and iodoform should be insufflated. In

the absence of Bellocq's canula, an ordinary gum elastic catheter forms a ready substitute for passing the string through the nostril, or a piece of silver wire, doubled so as to form a loop sixteen inches long, may be used. We have rarely found it necessary to adopt this somewhat unscientific method of checking hæmorrhage, and it must always be borne in mind that posterior plugging is not a procedure to be lightly undertaken, as deaths have been recorded from otitis media, pyæmia and tetanus, as a result of the operation. In all cases the presence of the plug is very uncomfortable to the patient.

Instead of plugging the posterior nares by a pledget of lint introduced through the mouth, St. Ange's rhinobyon may be used. This consists of a tube opening into a small india-rubber bag. The bag is passed through the nose backwards by means of a sound, and when in position it is inflated with a syringe, and the tube is closed by a clip. Finally, it may be mentioned that vinegar and lemon juice, as injections into the nose, have been credited with good results where other treatments have failed.

Various methods have been employed to retain the blood in the extremities, as, for instance, the application of a tourniquet on the thigh, fastening a ligature round the thighs close to the body, and if necessary also round each arm so as to check the venous, but not the arterial circulation, and, as previously mentioned, putting the feet into hot water.

Allusion has already been made to the importance of the liver as a factor in the coming on of hæmorrhage from the nose. During recent years several instances of intractable epistaxis have been cured by the strong counter-irritation of large blisters over the hepatic

region, and this in some cases where neither anterior nor posterior plugging was successful.

A rapid cure of profuse epistaxis in a case of syphilitic hepatitis has followed upon the administration of full doses of iodide of potassium. Gaucher mentions the case of a man suffering from nephritis accompanied with repeated epistaxis. When the patient was put on a milk diet the epistaxis disappeared, after the ineffectual application of blisters to the liver. These cases emphasize the importance of making a thorough examination of the patient.

After the hæmorrhage has ceased, either spontaneously or by means of treatment, it is advisable, when there has been a large loss of blood, or the patient is debilitated, to adopt measures to prevent its recurrence. A mixture containing sulphate of iron and sulphate of magnesium (formula No. 20) generally answers well, or the same mixture may be given in combination with ergot or digitalis. Ergot may also be administered hypodermically. Tincture of hamamelis in twenty-minim doses, or fifteen minims of oil of turpentine, have been found to answer in some cases. In the intervals between the attacks treatment should be directed against the underlying cause. For instance, the local condition should be carefully seen to, and any erosion or ulceration of the mucous membrane treated. It is most important that no crusts should be allowed to form in the nose, on account of the tendency to bleeding which their separation entails. To prevent this, the nostril from which the bleeding proceeds should be smeared two or three times daily, with vaseline or some simple ointment, such as boric acid ointment, or benzoated lard containing one in forty of carbolic acid.

Portal congestion should be treated by the adminis-

tration of saline aperients and a suitable diet. If, as is often the case, the patient be anæmic from loss of blood, it will be necessary to give iron in some form or another. The addition of arsenic will often increase the good effect of the iron. Finally, an objection may be raised that it is not desirable to cure an habitual epistaxis. But if the precautions which have already been alluded to be taken, the hæmorrhage from the nose may be arrested without fear of any injurious effects. This is especially true in the case of the young and middle-aged; in old age a little more caution must be exercised.*

29. ANOSMIA, HYPEROSMIA, AND PAROSMIA.

By the first is signified loss of the sense of smell; by the second, an increased sensitiveness of the sense of smell; and by the third, perverted olfactory sensations.

The appreciation of flavour, *aroma* or *bouquet*, apart from the sensation produced by salt, sweet, bitter, or sour things, is an attribute of the sense of smell.

For the proper working of the sense of smell, it is essential that gaseous, odorous substances should be brought into direct contact with the olfactory cells during the act of inspiration. It must be remembered that the olfactory nerves are distributed over the mucous membrane covering the upper part of the septum, the superior, and part of the middle turbinated bones. This is called the *olfactory* region; the mucous membrane is thick, moist, and is covered by a single layer of cylin-

* For further information on epistaxis see paper by Author (F. de H. H.) in *Westminster Hospital Reports*, vol. viii.

drical epithelium. The portion of the nasal cavity below this is called the *respiratory* region, and it is covered with ciliated epithelium.

From what has just been stated, it follows that anosmia may be brought about by causes preventing the access of odorous particles to the olfactory region; by changes in the mucous membrane affecting the peripheral ends of the olfactory nerves; and, lastly, by injury or disease of the olfactory bulb or the nerve centres. Hence one of the most common causes of anosmia is obstruction of the nostril by polypi, and they act not only directly, by giving rise to mechanical obstruction, but also by producing a sodden condition of the mucous membrane, very unfavourable to the sense of smell. On the other hand, excessive dryness of the mucous membrane will destroy the sense of smell. Any other cause of obstruction, such as deflection of, or outgrowths on, the septum, rhinoliths and other foreign bodies act in the same way. Dundas Grant mentions the case of a patient of his with facial paralysis resulting from a sarcoma, which involved the right *portio dura*, and who was, therefore, incapable of sniffing, or appreciating odours in the nostril of the affected side.

Changes in the nasal mucous membrane are responsible for most of the temporary and some of the permanent cases of anosmia. Familiar experiences of such are noticed in the loss of smell during an attack of acute rhinitis, and that which is more permanent in cases of atrophic rhinitis. The constant use of douches is said to act injuriously on the sense of smell by injuring the epithelium. Spirit lotions and sprays may occasionally act in the same way.

As regards changes in the periphery of the olfactory nerves, loss of pigment seems to play an important part.

The effects of too powerful smells, such as those from sewers, bisulphide of carbon, carbolic acid, &c., probably act by exhausting the irritability of the end organs of the olfactory nerve. Anosmia has been recorded as a result of excessive tobacco smoking. The patient was accustomed to blow the smoke through the nose. Discontinuance of smoking and the use of electricity and strychnine led to a cure. Clinton Wagner has observed that if the sense of smell has been exposed for a long time to a particular odour, the nerve endings become insensitive to this particular odour, but not to others. Anosmia may be due to injury or disease of the olfactory nerves, caused by blows or falls on the head (the occiput being the part generally struck), tumours, and disease of bone or membrane, as in syphilis. Cases of congenital absence of the olfactory nerves have been met with. Disease of the posterior third of the internal capsule may give rise to hemi-anosmia, which occurs in connection with hysterical hemi-anæsthesia. Or the centre for smell, localised by Ferrier in the anterior part of the uncinate or hippocampal convolution, may be affected. Cases of the occurrence of aphasia and right-sided hemiplegia with left-sided anosmia have been met with. The rule is that the anosmia is on the same side as the lesion, but there are exceptions.

Hyperosmia is met with in some cases of hysteria and insanity, and also as a result of the increased nervous sensibility which occurs in chronic debilitating illness. It must be remembered that, as a rule, the sense of smell is at least twice as acute in men as in women.

Parosmia has occurred after an acute coryza; it has also been one of the sequelæ of the recent epidemics of influenza, or, it may be the result of an irritation affecting the olfactory nerve, either at its origin or its

distribution. The patient usually complains of unpleasant smells, such as that of phosphorus, sulphur, tar, pitch, petroleum, garlic, burnt hair, urine, &c.

Under the head of parosmia may also be considered subjective sensations of smell. These cases occur in the insane, constituting the so-called olfactory hallucinations; and in epileptics the aura may be referred to the olfactory nerves. Such subjective sensations are by no means uncommon at the climacteric period of women and the recognition of this fact may save the patient from a useless course of local treatment (*vide* "Three Cases of Parosmia," *Lancet*, 1895, H. T.).

Diagnosis.—For the purpose of estimating the acuteness of the sense of smell, Zwaardemaker has invented an ingenious instrument, which he calls an olfactometer (*vide British Medical Journal*, 1888, vol. ii., p. 1295).

In testing the sense of smell, the use of pungent substances, such as ammonia, which excite the fifth nerve, should be avoided. The essential volatile oils—like cloves, bergamot, and the foetid gum resins, or musk and camphor—should be employed.

In many instances the patient's attention is first directed to the condition of the olfactory nerve owing to the fact that he cannot taste properly, *i.e.*, that he cannot appreciate flavours.

It must also be remembered that in cases of unilateral anosmia the defect will not, in all probability, be discovered unless the affected nostril be carefully tested.

Prognosis.—In cases due to such causes as the presence of polypi, foreign bodies, &c., which are removable, the prognosis is good, always providing that the functional activity of the nerve has not been too long suspended. Even here the anosmia may have lasted many years (in one record case forty years) and

yet the sense of smell has returned when the obstruction was removed. The case is quite different when the cause is seated in the mucous membrane itself, as, for example, in cases of chronic rhinitis. Here changes occur in the end organs of the olfactory nerves, and recovery rarely takes place where the loss of smell has existed for more than two years. In anosmia due to traumatism and central nerve disease, the prognosis is very unfavourable, except in cases of syphilitic origin.

Treatment.—If the anosmia, or other disturbance of the sense of smell, be due to local disease, this should receive its appropriate treatment. Should there be any delay in the restoration of the sense of smell after the nasal passages have regained a healthy condition, attempts may be made to stimulate it by the use of strong scents, both pleasant and unpleasant. The insufflation of irritant powders, *e.g.*, snuff, and spraying the nostril with alcohol, have been suggested with the same object. Counter-irritation, in the shape of a blister to the neck, has been found of use; as also has been the application of the galvano-cautery to the anterior end of the middle turbinal body. Of drugs used internally, strychnine and iodide of potassium are the only ones which seem to have any influence. The former acts by stimulating the nervous system, the latter by promoting the absorption of inflammatory material, and is, of course, especially useful in the syphilitic cases. Mackenzie has seen good effect follow the insufflation twice daily of a powder containing $\frac{1}{24}$ grain of strychnine with two grains of starch. Douches of carbonic anhydride, as from an ordinary gazogene apparatus, have been attended by good results.

Gowers points out that the olfactory nerve is not accessible to electrical stimulation, though faradisation

of the nasal mucous membrane has been recommended in hysterical cases. Removal of the uvula, in association with relaxation of the soft palate, has been followed in more than one instance by restoration of the sense of smell.

30. THE ANATOMY OF THE SINUSES.

The **maxillary sinus**, or antrum of Highmore, is usually a pyramidal-shaped cavity, hollowed out of the body of the maxillary bone. Its form, however, varies considerably, and not unfrequently there is a want of correspondence between the two antra. The antrum is larger in the male than in the female. It commences to develop at the fourth month of intra-uterine life, and at birth is present as a small cavity separating the orbital and palatal processes of the superior maxillary bone. In early life the antrum is small and has thick walls. It attains its maximum size in adult life, and becomes smaller in old age. The base of the cavity is formed by the outer wall of the nasal cavity and is comprised in part by the uncinate process of the ethmoid, palate and inferior turbinate bones, while the mucous membrane during life reduces the large ostium seen in the dry preparation to a very small orifice. Its apex is formed by the malar process and its sides are formed by the orbital plate, the malar process, the alveolar process, and the zygomatic surface of the superior maxilla. Projecting into the floor are sometimes seen prominences corresponding to the outer alveoli of the teeth, usually the second bicuspid and the first and second molars. The number of teeth which may project into the antrum varies. The ostium maxillare or orifice of the antrum opens into the hiatus

semilunaris, a curvilinear depression situated between the middle turbinate and the outer wall of the nose (fig. 31). The antral cavity is sometimes partially, and rarely completely, divided by bony septa into separate chambers. Along its inner wall courses the lachrymal canal, the lower opening of which is overhung by the

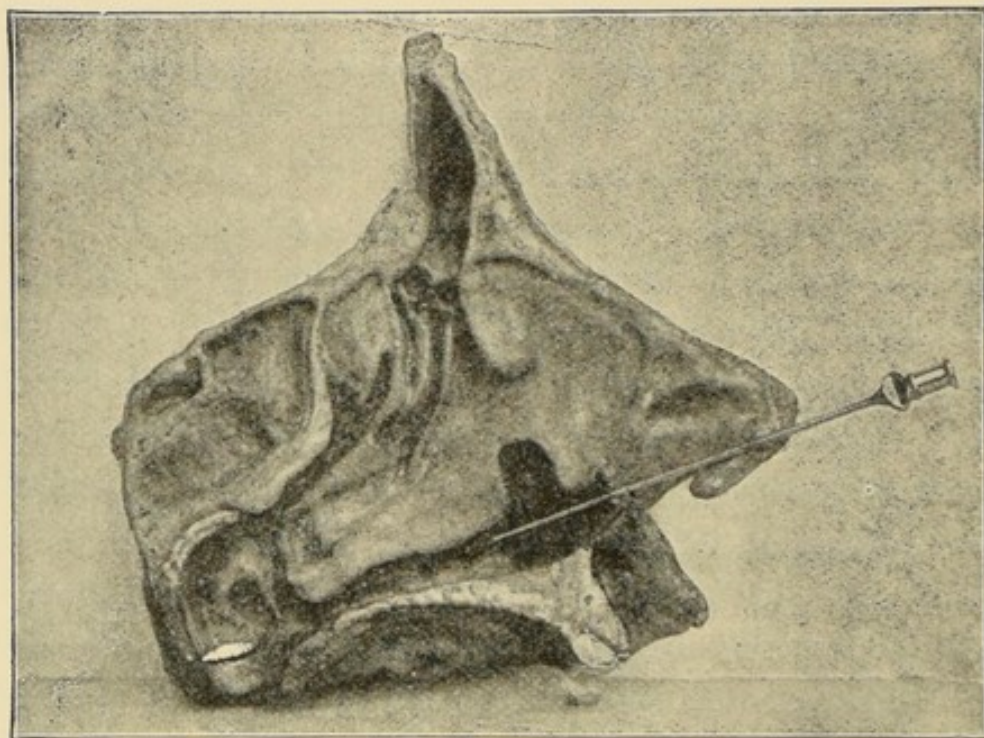


FIG. 31.—Photograph of outer wall of left nasal cavity, in which the middle turbinal has been removed, thus showing the groove of hiatus semilunaris in which are situated the openings of the antrum and anterior ethmoidal cells. A portion of the inferior turbinal has been removed and an exploring trochar passed into the antrum. (From De Schweinitz and Randall's "Diseases of Ear, Nose and Throat," vol. ii. Philadelphia, Saunders; London, Rebman, Limited).

inferior turbinal and is distant from the anterior nares about 30 to 35 mm. When the antrum is large it may be separated from the corresponding sphenoidal sinus by only a thin bony septum, and its intimate relation with the anterior ethmoidal cells is obvious from the accompanying diagram (fig. 32). The frontal sinus may com-

municate almost directly with its corresponding maxillary sinus (fig. 36). In the dry specimen the relation of the antrum to surrounding parts seems very obvious, but under natural conditions the anterior surface avail-

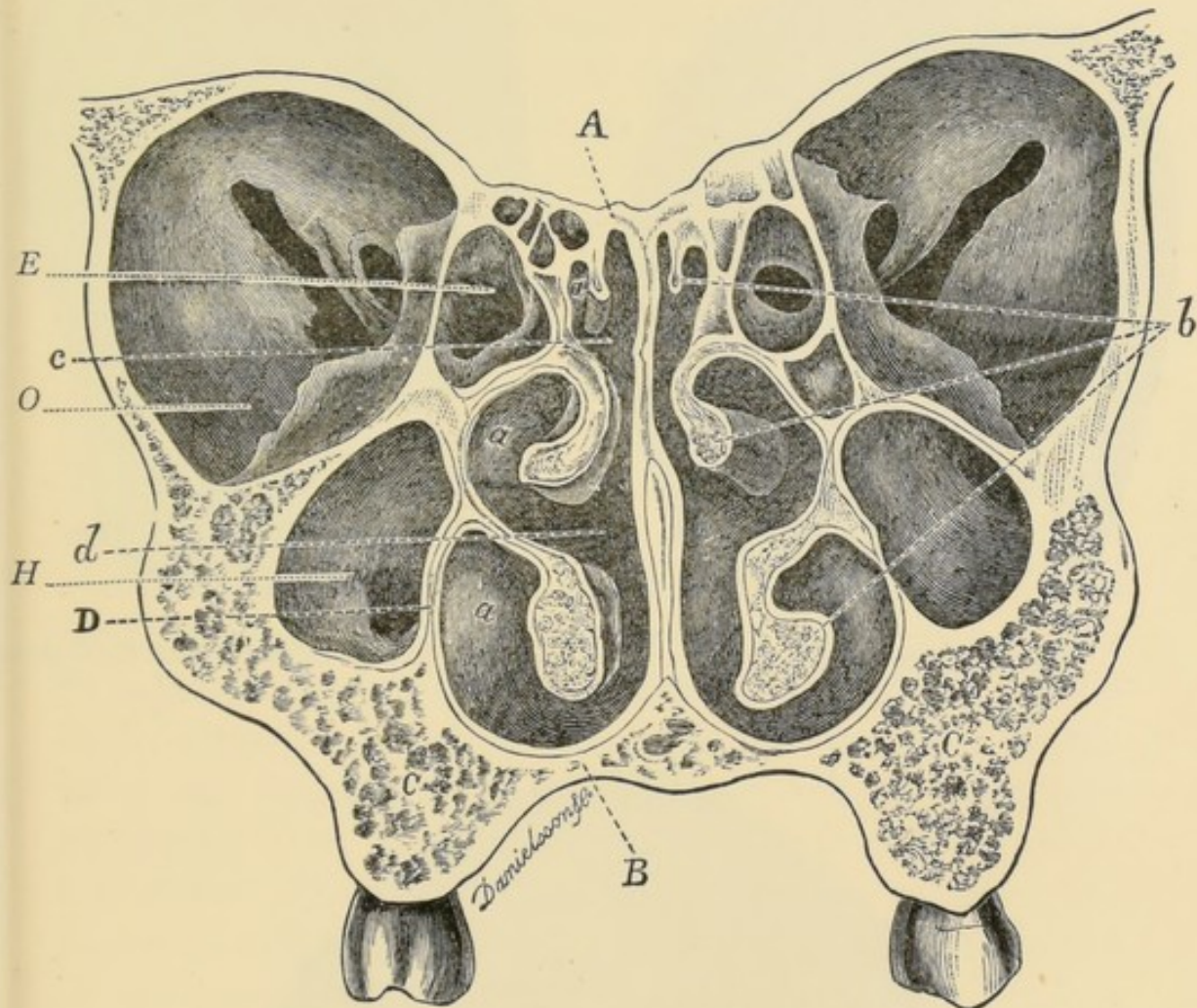


FIG. 32.—Vertical Transverse Section of the Nasal Fossæ.*

A. Roof of nasal cavity. *B.* Floor of nasal cavity. *C. C.* Alveolar processes. *D.* External wall of nasal cavity. *a. a. a.* Three meatuses. *b. b. b.* Three turbinated bodies. *c.* Olfactory slit. *d.* Respiratory region. *E.* Ethmoidal sinus. *H.* Antrum of Highmore. *O.* The orbit.

able for operative interference is limited, unless incisions are made into the soft parts, and the tendency is to imagine the antrum is more median in position than is the case. A surgeon in endeavouring to trephine the

* From Cresswell Baber's "Guide to the Examination of the Nose."

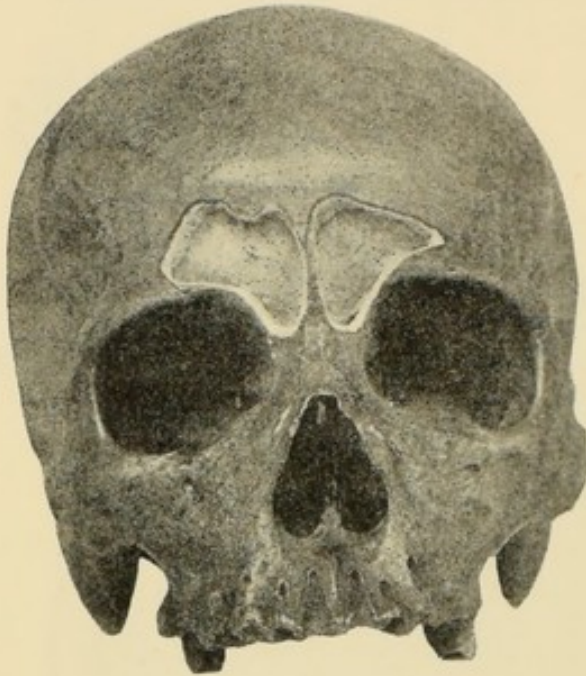


FIG. 33.—Normal sinuses.

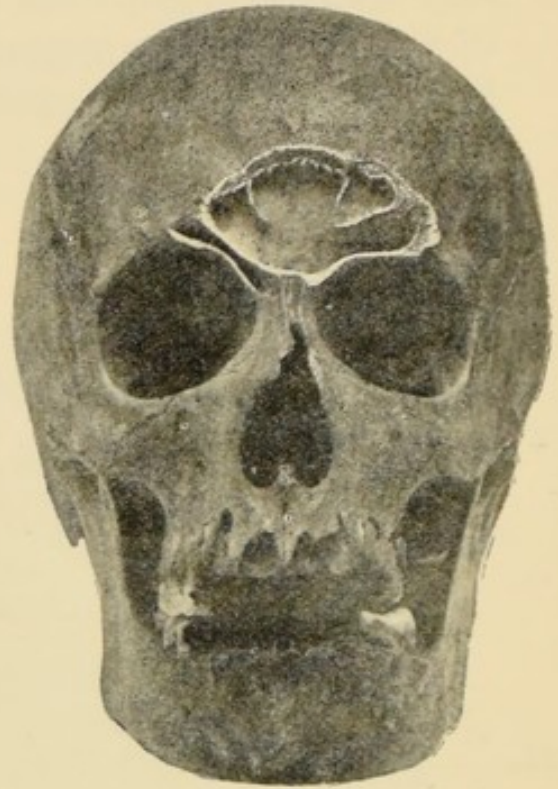


FIG. 34.—A large left and small right sinus.

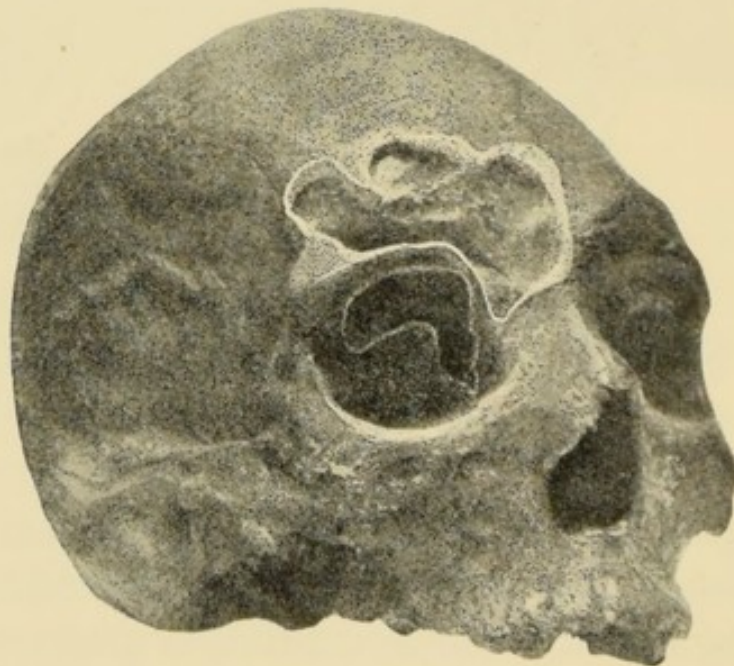


FIG. 35.—Extensive right sinus.

anterior antral wall has been known to miss the sinus altogether and find himself in the nasal cavity. On two occasions, moreover, I (H. T.) have removed from the right inferior meatus a silver drainage tube which was inserted into the canine fossa and was supposed to be draining the antrum, but it had entirely missed the latter cavity so that while its proximal end was in the canine fossa under the upper lip, the distal end projected into the nasal cavity. Finally, the naso-antral wall may be so thick that it is difficult to pierce it with any of the slender trocars used for exploration of the antrum.

Frontal Sinuses.—Under normal circumstances these cavities “are contained in the lower part of the frontal bone above the root of the nose and the inner ends of the eyebrows” (Quain). The sinuses extend upwards and outwards between the two tables of the skull to a varying extent, but an average sized sinus may be taken as one which measures 28 mm. from the middle line outwards, reaching to about the junction of the inner and middle thirds of the supra-orbital ridge, and extending from 20 to 22 mm. vertically from the nasion. For fuller information respecting these cavities the reader is referred to my (H. T.) article on the subject in the *Lancet* of Sept. 26, 1896, and to Logan Turner’s in the *Edinburgh Medical Journal*, April and May, 1898. We are indebted to the latter gentleman for the loan of the three photographs here reproduced.

The following points should be borne in mind by the student.

1. The frontal sinuses do not commence development till the seventh year of life.
2. They vary greatly in size, not only in different, but on opposite sides of the same skull (fig. 34).
3. They may be absent on one or both sides.

4. A complete, thin, bony septum separates the sinuses from one another in health but it may be destroyed by disease ; it is not uncommon to find the sinuses freely communicating in chronic empyemata of these cavities.

5. The external configuration of the skull gives no clue whatever to the size of the underlying sinuses.

6. A large sinus may extend outwards to the external angular processes of the frontal bone, or even into the temporal fossa (fig. 35), upwards beyond the frontal eminences, and backwards almost to the junction of the frontal and sphenoid bone.

7. The entrance (infundibulum) to the fronto-nasal passage is situated considerably further backwards than is usually supposed, and may be 28 mm. from the anterior surface of the bone.

8. The direction and patency of the fronto-nasal passage varies very much. The curve may be so marked that it would be impossible to pass a probe into the frontal sinus from the nose without making a false passage.

9. Bony septa may more or less divide the sinuses into larger or smaller recesses (fig. 35). Such septa are more common in the outer portion of the sinuses.

10. If the crown of a small $\frac{1}{4}$ inch trephine is applied to the lower and inner part of the frontal bone, situated between a vertical median line and a line drawn perpendicularly upwards from the internal angular process, it will in all cases open the corresponding sinus if one exists on that side.

11. Finally, it should be especially remembered that the frontal sinus may communicate directly with the corresponding maxillary antrum, and the bearing of this fact on the liability of disease to spread from one sinus to the other is obvious. Tillaux points out "that

if fluid be injected into the frontal sinus, instead of running into the middle meatus, it passes in great part

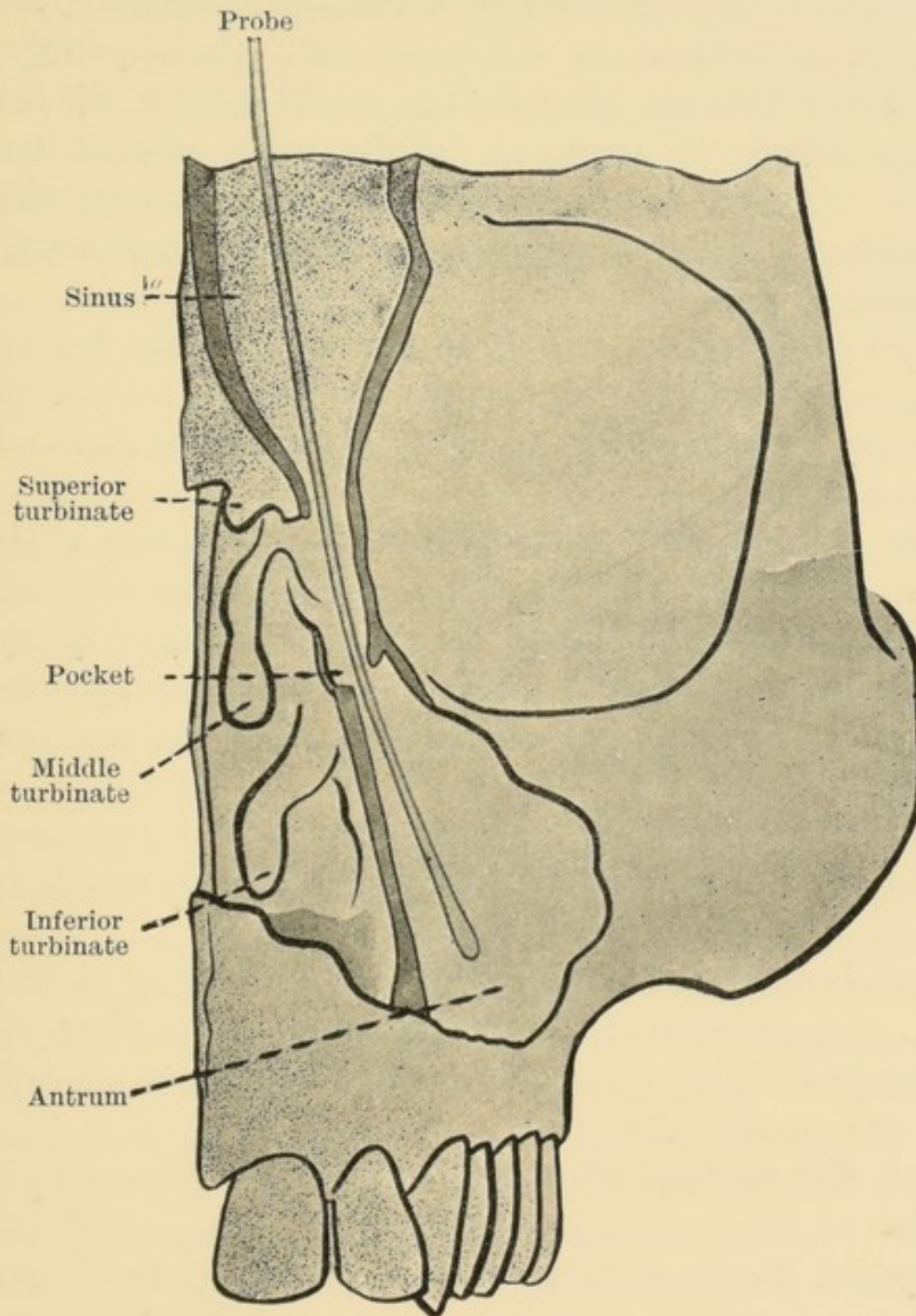


FIG. 36.

into the antrum." The accompanying diagram kindly lent to us by Filliebrow of Boston explains the reason for this. It will be seen that the infundibulum termin-

ates at or in the antral opening, and that a fold of mucous membrane extends above the foramen, forming a pocket at the bottom of which is the antral foramen, the fold referred to being on the inner side. Consequently, a discharge from the frontal sinus would tend to fill the antrum before it appeared in the nose, and so the antrum may act as a reservoir for discharge from the ethmoidal cells, or frontal sinus, without itself being primarily diseased.

A full appreciation of these latter facts has had a great deal to do in placing the radical treatment of accessory sinus suppuration upon a more scientific and practical basis.

The Sphenoidal Sinuses are two irregular cavities hollowed out in the body of the sphenoid, and separated from one another, more or less completely, by a thin bony septum. They open into the sphenoidal recess at the posterior part of the superior meatus.

At birth the sinuses scarcely exist; they commence developing during the third year, but remain small till puberty, when they rapidly increase in size.

Their intimate connection with the posterior ethmoidal cells, and occasionally with the maxillary antrum, is important from the point of view of extension of disease from one sinus to the other.

The Ethmoidal Sinuses.—These are formed by a number of inter-communicating cell cavities, which are interposed between two vertical plates of bone, the outer one forming part of the orbit and the inner one part of the nasal fossa. The ethmoid cells are divided into an anterior and posterior group, the former being sometimes again divided into an anterior and middle set. The posterior group open into the superior meatus,

and the anterior and middle into the hiatus semilunaris (middle meatus) by one or more openings.

The posterior ethmoidal cells are in close connection with the sphenoidal sinus, and the fronto-nasal canal passes through the anterior ethmoidal group.

The intimate relationship of the anterior cells to the maxillary antrum has already been referred to.

Accessory Sinus Suppuration.—Since suppurative processes, acute or chronic, are the most frequent and therefore most important of the accessory sinus affections, and since clinical experience has shown that it is very common for one sinus to infect, or be affected coincidentally with another, it may be wise to briefly consider the ætiology of suppuration in general as met with in these situations.

There is at present considerable difference of opinion as to the exact course of events leading to empyema of the nasal accessory sinuses. In the case of the antrum some hold the source of infection to be septic matter originating from the roots of carious teeth, and in this connection Sewill tersely says "The roots of several teeth are separated from the cavity by merely a thin layer of bone; sometimes the roots of molars extend within, covered only by a thin osseous film beneath the mucous membrane. Periodontitis affecting such roots may give rise to suppuration, and thus extending to the antrum may establish empyema, or pent up discharges from suppurating or gangrenous pulp of the teeth may make their way through root foramina into the cavity and excite the disease."

On the other hand, it must be remembered that we have to deal with irregular bony cavities lined by a mucous membrane continuous with that of the nasal fossæ, and these cavities communicate with the nasal

chambers by small apertures, which in the case of the antrum and ethmoidal cells, serve very inefficiently, on account of their position, for drainage. The nasal mucous membrane is very liable to catarrh, and its continuity with the lining of the accessory cavities renders the latter prone to the same condition by simple extension of the catarrhal process. Hence we can easily understand an acute nasal catarrh followed by a similar condition, with retention of the secretions in the accessory sinuses, a condition possibly accounting for some of the frontal discomfort during an attack of acute rhinitis. Such secretions, under tension where drainage is inefficient, may increase the inflammation, and if certain micro-organisms gain access to the suitable medium thus provided suppuration may occur; it may be in the antrum, or in a single ethmoidal cell, or in a frontal sinus. If we suppose an ethmoidal cell to be affected and to have become a focus of suppuration, it is more than probable that the contained pus may find its way into the maxillary antrum, or even into a frontal sinus and vice versâ.

So that given an acute or chronic catarrhal condition of the nasal mucous membrane acting as a predisposing cause, the exciting cause of empyema may be organisms associated with influenza, syphilitic nasal lesions, insanitary surroundings, convalescence from long illnesses, especially acute infectious disorders, while as already mentioned, most cases of antral suppuration are due to septic inflammation starting from the root of a carious tooth, especially the second bicuspid and first or second molar. In a small proportion of cases the careless use of the galvano-cautery may be the cause of sinus empyema.

31. DISEASES OF THE MAXILLARY SINUS.

Suppuration of the Maxillary Sinus; Empyema of the Antrum.

A collection of pus in the antrum of Highmore.

Ætiology.—As already intimated, two views are held as to the cause of antral empyema, some considering it is more often due to intra-nasal, others to dental lesions. We strongly incline to the latter view because, out of a large number of cases seen during the past ten years, one of us (H. T.) can scarcely recall a single case in which carious teeth have not been present on the same side as the antral suppuration. We, however, recognise the possibility of intra-nasal disease being the primary lesion, and admit the validity of Zuckerkandl's reasoning, that in the later stages of an empyema the roots of neighbouring teeth may be rendered carious by periostitis set up in them by the antral disease.

Morbid Anatomy and Pathology.—In a series of cases of chronic empyema of the antrum Gruenwald found "five times a smooth mucous membrane, in five cases a pillow-like thickening of the mucous membrane; numerous granulations had invaded the cavity in these cases; twice the bone was partially denuded; three times there were bands of caries in the osseous wall; in four cases the lesion was accompanied with granulations." In chronic cases which have remained uncured after long continued syringing and in which curetting of the antrum has been ultimately carried out, the cavity is nearly always found filled with large polypoid granu-

lations, or lined with a velvety mucous membrane, which on microscopical examination has proved to be highly papillary.

In such cases the middle meatus of the nose is generally found to be occupied by large granulations or even polypi, while the nasal mucosa exhibit various forms of hypertrophic rhinitis, the result of chronic irritation by the purulent discharge. The cushion of mucous membrane seen in many cases between the anterior end of the middle turbinal and the outer wall of the nose is probably inflammatory in origin *e.g.*, periostitis of the uncinate process of the ethmoid.

Streptococci and staphylococci are constantly found in the pus.

It is by no means uncommon to find the antral, ethmoidal, and frontal sinuses, simultaneously involved in a suppurative process, which has spread from one to the other in the manner already described. In such cases polypi and granulations are nearly always present in the nose.

Hajek, and still more so Gruenwald and Michael, are inclined to look upon atrophic rhinitis as a frequent result of sinus suppuration but we doubt the frequency of this sequence, because in a great number of cases of atrophic rhinitis in which the sinuses were explored by one of us (H. T.) no pus was found in them. Moreover atrophic rhinitis often commences at an age when the sinuses have not commenced development.

Symptoms.—Cases of empyema of the antrum may be divided into two groups :—(1) Those in which there is no exit for the pus, and (2) Cases in which the ostium is patent, and allows the pus to escape into the nasal cavity. The first class of cases is much rarer

than the second, and in it there may be bulging of any of the antral walls, especially the canine fossa, or the floor of the orbit, in which case eye troubles may result. The patient generally suffers from violent pains of a neuralgic character, and there may be swelling of the soft parts of the cheek, sometimes of an erysipelatous character (Semon, *Lancet*, 1890, p. 968). It should be noted, however, that bulging of the antral walls usually depends on the presence of a cystic tumour and not on pus (Virchow).

In cases of suppuration of the antrum where there is no impediment to the escape of pus through the normal opening, there will be a unilateral discharge of pus occurring in an intermittent manner. In cases in which both antra are affected, there may be a bilateral discharge. The amount may be increased if the patient lowers the head, so as to make the ostium the most dependent part of the antrum. The pus is sometimes foetid, especially in chronic cases, and where carious teeth are present on the same side; but since the olfactory region of the nose is not affected the patient is conscious of the foetor which may be unnoticed by those about him (cf. Atrophic Rhinitis). The pus is usually discharged anteriorly; but if it trickle backward, the complaint may be of a "sickly taste" being constantly present, and the appearance of the pharynx may simulate naso-pharyngeal catarrh. Pain may be a prominent symptom, and is commonly referred to the supra-orbital region, but it may be felt in the cheek, in and around the eye, or in the occipital region. Its periodicity has been so marked in some instances, that it has been treated as a malarial manifestation until its true source has been discovered. It is usually worse during the earlier hours of the day. Pain, however, is

not a constant symptom, and its presence or absence probably depends upon whether there is a free exit or not of the pus into the middle meatus. Hartmann ascribes the supra-orbital pain to absorption of air from the frontal sinus, owing to blocking of the lower end of the fronto-nasal canal by catarrhal swellings or inflammatory growths in the middle meatus. Pressure over the anterior antral wall may elicit pain, while toothache is often present, as would naturally be expected. In acute and chronic empyema, the onset of suppuration may be accompanied by febrile disturbance and a slight rigor. In acute empyema, following acute coryza, the patient may complain of pain in the upper jaw, coming on suddenly, with a feeling of weight in the antrum, and perhaps some swelling and tenderness of the cheek.

The constant swallowing of pus tends to produce indigestion, nausea, and anorexia, the patient's general health is interfered with and neurotic individuals complain of depression and unfitness for their daily work. To the main symptoms of purulent nasal discharge and pain, is often added that of nasal obstruction due to polypi, large granulations, or hypertrophic rhinitis, produced by the irritation of the purulent discharge.

Diagnosis.—The symptoms of empyema of the antrum, where there is no exit for the pus, are so characteristic that they can only be confounded with those produced by a cyst or growth in the cavity. To make a differential diagnosis between the two, an exploration of the sinus may be absolutely necessary.

In the more common chronic cases, in addition to the above symptoms, there are certain presumptive signs, and one certain test of pus in the antral cavity. Under the former we may mention:—

(a). *Intra-nasal appearances.*—If the canary-yellow pus

seen in the middle meatus is mopped away and the patient is directed to lower his head keeping the suspected antrum uppermost for a full two minutes, a reappearance of pus in the middle meatus strongly suggests antral disease, but it must be distinctly understood that the same thing may occur with frontal sinus, or ethmoidal empyemata.

(b). Granulations always, and polypi in many cases, are found in the middle meatus in antral cases of any chronicity.

(c). Not uncommonly a smooth rounded cushion of mucous membrane is to be seen between the anterior end of the middle turbinate and the outer wall of the nose, which at first sight resembles a cleavage of the middle turbinal (*vide* Morbid Anatomy). When this swelling is associated with intra-nasal suppuration its presence may be regarded as pathognomonic of antral empyema, but it may sometimes be seen in the absence of a purulent discharge, *e.g.*, in certain forms of chronic dry rhinitis and in atrophic rhinitis.

(d). Carious teeth on the same side as the discharge afford additional presumptive evidence of the source of the latter.

(e). *Trans-illumination*.—The method of trans-illuminating the cavity by electric light is a valuable aid to diagnosis. The lamp (fig. 37), attached to a suitable tongue-depressor, is introduced into the patient's mouth. The room is then darkened, and the electric light turned on. The patient may have charge of the switch, so as to turn the light out when the lamp becomes too hot. If the antrum be empty, the cheek will be seen to be translucent, the colour being especially bright beneath the lower eyelid, and the pupil is seen in red light. The patient also experiences a sub-

jective sensation of light, and the equality or inequality of his sensations in the two eyes is regarded by Burger as the most important and reliable feature in the test. The amount of translucency varies with the size of the cavity, the thickness of the bony wall and the soft parts. Trans-illumination is prevented if the antrum be occupied by pus or a solid growth. Thickening of the lining membrane, such as results from an old-standing empyema, will also interfere with the translucency. This test, which at first seemed to pro



FIG. 37.—Electric Lamp for Trans-illumination.

mise to be of decisive value, is not altogether reliable, as the antra vary much in size and in the thickness of their walls; moreover, even in the same individual, the antrum on one side may differ from the other. In old people the bones become less translucent. Kelly points out that trans-illumination is of value in distinguishing a cyst from the solid growth in the antrum. If the cyst has thin walls and serous contents, the translucency is increased, whereas in a solid growth it is lessened, provided the growths are not mucous polypi, in which case the translucency may be increased.

(f). The certain test above referred to is exploration of the antrum. The little operation is one which can be carried out without a general anæsthetic, it is almost painless, bloodless, and its evidence is conclusive. A small piece of cotton-wool upon a probe is moistened with a 10 to 15 per cent. solution of cocaine and passed between the anterior end of the inferior turbinate and the outer wall of the inferior meatus, and gently rubbed into the inner or nasal wall of the antrum which in this position is often thin. In a few moments a Lichtwitz's trochar and cannula (fig. 38) are passed in the same direction as the probe was passed, and so far these manipulations are carried out by means of anterior rhinoscopy and a speculum. The latter instrument is then withdrawn and the patient's head is supported while the trochar is firmly but quickly pressed into the antrum, when the trochar is withdrawn leaving the cannula in position. To the proximal end of the latter is attached the rubber tube of a syringe containing warm normal saline solution, or boracic lotion. The syringe is gently compressed while the patient leans over a basin and breathes through the mouth; if there is any pus in the antrum it is washed out and easily detected. If there is no pus the patient is neither hurt nor robbed of a useful tooth, while the surgeon knows that the antrum is not the source of the purulent discharge. The instrument and the method of exploration have been modified by various authorities, but I (H. T.)



FIG. 38.

have never found any reason for departing from the procedure described. Occasionally the inner antral wall may be difficult to perforate with the trochar, but a slight alteration in its position will usually find a thinner area which can be pierced. I have never seen any damage done to the lower end of the nasal duct by this method of exploration.

When there is a discharge of bright yellow pus appearing in the middle meatus on one side, there may be much difficulty in deciding whether it comes from the maxillary, ethmoidal, or frontal sinuses. The pus may also proceed from a suppurating pouch in the middle turbinated body. The diagnosis of these conditions will be discussed under the respective headings, but we lay it down as a good general rule, that whenever pus is found in the middle meatus, the antrum should always be suspected and explored before any other measures are adopted.

Treatment.—The treatment of empyema of the antrum may be considered under the following heads: (1) Perforating the floor of the antrum through the alveolus; (2) Perforating the superior maxillary bone in the canine fossa; (3) Perforating the outer wall of the nostril in the inferior meatus; (4) A combination of methods 2 and 3.

Considerable difference of opinion exists amongst surgeons as to the best treatment for chronic cases of antral empyema, a difficulty which in our opinion is enhanced by an endeavour which is sometimes made to prescribe a certain procedure which shall be applied to simple and complicated cases alike. The following is the general line of treatment which we can confidently recommend. Under nitrous oxide anæsthesia, the second bicuspid or preferably the first or second

molar tooth, one of which is very often carious, is extracted, and an opening made into the antrum through the alveolar socket by means of an antral perforator (fig. 39). In the absence of the latter an ordinary bradawl may be employed. Through this opening the antrum is washed out with a warm antiseptic alkaline lotion, boracic lotion, or even, as some recommend,

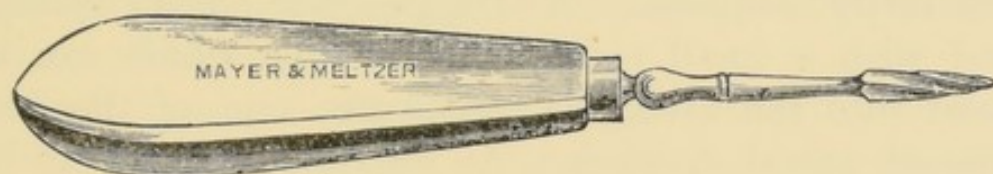


FIG. 39.—Perforator.

warm salt solution. In order to keep the alveolar perforation open, an Ellis' silver wire drainage tube, with a calibre equal to that of a crow-quill, should be inserted, and in spite of the fact that it affords communication between the mouth and the antrum for the



FIG. 40.—Silver Wire Drain Tube.

entrance of septic matter, yet it will be found that many cases are cured by this, the "alveolar method" of treatment. Others prefer a gilt tube connected with a metal plate fastened to the adjacent teeth—the tube may be fitted with a plug which shuts off communication with the mouth and is removed for syringing purposes only. Where economy is to be studied a vulcanite plate supporting an upright solid plug may be used—the former being fixed by hooks to adjacent teeth. There is a great variety of "antrum drains" upon which much ingenuity has been lavished, but the important point is to provide the patient with a simple apparatus which

he can easily manage for himself. If an Ellis' tube is used, the slight roughness of its surface enables the soft tissues to retain it without much fear of its slipping into the mouth during sleep. The patient has now to obtain a suitable syringe with which the antral cavity is washed out morning and evening, and for which purpose the drainage tube must be temporarily removed. A Higginson's enema syringe fitted with a small metal delivery tube which can be passed into the alveolus, constitutes one of the best forms of antral syringes. As regards the lotion to be used, some advise warm salt solution (3 ss. to Ojss.), others an alkaline antiseptic wash, creolin (1 in 500 to 1000), sulphate of zinc gr. ii. ad 3j., &c., but the important thing is irrigation, twice or three times daily at first, when the discharge lessens, once daily, then alternate days, and so on, until an interval of a week or ten days is passed between consecutive irrigations; if then on syringing no pus returns in the lotion, the case may be considered cured and the tube removed. A change of lotion often hastens the improvement of the case. The great advantage of this method is:—
(1) It drains the antrum from its lowest point—a most important point in the cure of any suppurating cavity;
(2) The treatment after one or two visits to the surgeon can be easily carried out by patients in their own home.

It is advisable that all carious teeth on the affected side should be removed at the commencement of treatment, because it is impossible to say which may be causing the trouble. One cause of delay in cure by this method is that too long a drainage tube is placed in the antrum, so that the pus has to rise to a certain level before it drains away. The correct length can be easily

determined by measuring with a small thread of soft silver wire, one end of which is curved over and passed through the alveolus into the antrum. After a short period of insertion also, the superfluous portion of the tube becomes discoloured and can be removed.

The above method of treatment is often particularly satisfactory in cases of not more than from two to three months' standing.

Upon rare occasions the surgeon may find some difficulty in tapping the antrum through the alveolus. This occurs when the antrum is small and situated high up in the maxillary bone, and under such circumstances it is usually better to make an intra-nasal opening (*vide infra*).

Sometimes, however, we meet a case where there are no carious teeth. It would perhaps be inadvisable to remove a sound tooth to gain access to the antrum, and under such circumstances one of two courses is open to the surgeon.

1. *To perforate the sinus from the canine fossa.* The drainage tube in this case should have a fairly wide collar, because after the perforation the mucous membrane tends to swell up and the tube is easily lost underneath the swollen tissue. When the swelling has subsided the apposition of the upper lip will keep the tube from falling into the mouth. By this mode of treatment the patient, if he forgets his syringe, can cleanse the antrum by holding the lotion between the teeth and cheek on the affected side, and then forcing the air from behind, and compressing his buccinator in front, the retained fluid is driven into the antrum and out of the corresponding nostril. The disadvantages of the method are:—(a). The antrum is not drained from its lowest point. (b). It is more difficult for the patient to syringe

it successfully. (c). The soft tissues after perforation are often tender for several days and occasionally a small abscess forms in the mucous membrane round the tube.

2. *To perforate the inner wall of the antrum from the nose.*—The operation is best carried out under a general anæsthetic. The opening may be made by Krause's curved trochar and cannula (fig. 41) and should be situated in the inferior meatus about one inch behind the anterior extremity of the inferior turbinal. If necessary the anterior half of the latter bone may be removed in order to render the artificial opening more accessible to the patient. The advantages claimed for this method are

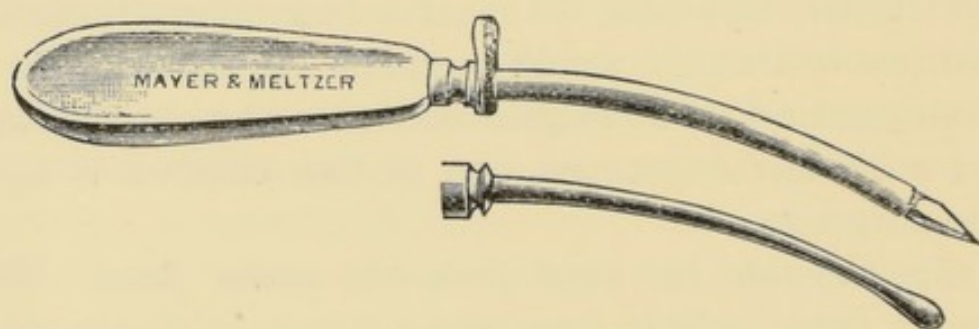


FIG. 41.—Krause's Trochar and Cannula.

that the opening does not communicate with the mouth and extraction of teeth is unnecessary. The disadvantages are that some patients find a difficulty in finding and keeping patent the naso-antral opening, which should therefore in all cases be made large enough to admit the tip of the little finger.

Garel and Bronner strongly advocate, and have practised with success, irrigation of the antrum through the natural ostium by a special cannula devised by them. We think this method must be impossible to many patients, and that thorough irrigation through a cavity is much more likely to cleanse it than an injection into

its upper end, and finally the natural ostium is quite inefficient for drainage purposes.

Whichever of the above methods is adopted, it need scarcely be said that suitable intra-nasal treatment should be carried out from the first; hence polypi and granulations, or the swollen anterior extremity of the middle turbinal, should be removed from the middle meatal region, and obstructive forms of hypertrophic rhinitis dealt with in the manner already advocated.

Occasionally, however, in spite of syringing and change of lotions, the antral suppuration continues as freely as ever, and the patient is tired of the chronic discharge. Such cases may be dealt with radically, and it is probable that this course alone offers any chance of cure, because the protracted suppuration is generally due to the antral cavity being filled by large unhealthy granulations. It must be remembered also, that the antrum in such a case may only be acting as a reservoir of pus, coming from the ethmoidal or frontal sinuses above, and that treatment of these cavities may be necessary before we can check the purulent nasal discharge (*vide infra*).

The radical operation as first described by Caldwell and then practised in this country by Scanes Spicer is somewhat as follows:—An incision is made along the gingivo-labial fold, over the anterior antral wall—the soft parts and periosteum are retracted, and by means of chisel and mallet, or small trephine, an opening into the antrum is made, sufficient to admit the tip of the thumb. The granulations are then freely, but carefully curetted away, and all crevices or pockets are searched out with a small sharp spoon. The hæmorrhage may be free for a few moments, and hence it is well to plug the corresponding posterior choana before

commencing the operation. Having cleared the antrum, a free opening is next made in the anterior part of the inner antral wall into the inferior nasal meatus. Should the inferior turbinate be very large its anterior half may be removed a week prior to the radical operation in order that the artificial naso-antral opening may be free from obstruction.

The sinus is finally mopped out with 1 in 500 perchloride of mercury, or 1 in 10 carbolic, or 1 in 40 chloride of zinc lotions, dried, and then packed with a strip of iodoform gauze, the proximal end of which is passed through the naso-antral opening and out of the nostril. A single stitch may then be inserted to draw the edges of the reflected periosteum and soft parts together over the buccal opening into the antrum. Some pain and swelling in the cheek are not uncommon after the operation and are much relieved by glycerine and belladonna fomentations, or the constant application of ice-cold pads of lint.

The packing should be removed in forty-eight hours and the antrum syringed through the naso-antral opening with warm boracic lotion, a treatment which should be continued twice daily for two or three weeks and then once daily until the lotion returns perfectly clear from the sinus when the case may be considered cured. The opening into the mouth usually heals without difficulty.

Excellent results have been obtained by this operation, but it should be strictly reserved for cases in which the alveolar or some simpler treatment has first been tried and failed.

In conclusion it is only fair to say that even the radical operation does not cure all the cases for which it has been adopted, probably because surgeons have

not been sufficiently careful in selecting their cases to eliminate those in which the discharge is really coming from another sinus, the antrum merely acting as a reservoir of pus.

Acute and Chronic Non-Suppurative Catarrh of the Antrum.—When the nasal cavities are affected in this way the antral mucous membrane is usually implicated and expresses itself in deep seated pain in the cheek, orbit, or molar teeth, while in chronic catarrh there may be occasional discharges of clear sero-mucous fluid from the antrum, followed by relief of the discomfort caused by its retention. Such cases rarely come under treatment.

Cystic Disease of the Antrum.

In addition to containing pus, the antrum may occasionally be distended with a clear fluid. As already stated, if there be much distension of the antrum, this is probably due to a cystic formation rather than to empyema. The fluid is usually clear, and of a viscid nature; it may become flaky from the presence of cholesterine. Occasionally, the fluid has a greenish tinge, or it may even be purulent. The cyst most probably arises from dilation of one of the glands of the antral mucous membrane. If the distension of the bony walls be great, swelling of the cheek, protrusion of the eyeball, nasal obstruction, and eggshell crackling on palpation of the canine fossa may be noticed, and trans-illumination would probably show a brighter illumination than on the sound side (Kelly).

Treatment.—Christopher Heath recommends that the anterior bony wall, which is usually thinned by pressure, be incised, and the fluid evacuated. The

finger can then be introduced, in order to discover if there be any growth or tooth in the cavity. Syringing with a stimulating lotion or packing with iodoform gauze is usually sufficient to effect a cure.

Cysts in connection with the teeth may involve the antrum, while polypi, epitheliomata, sarcomata, osteomata and other neoplasms may take origin within its cavity. The distension produced by a cyst is so similar to that caused by a malignant growth that in all cases we should advise a preliminary aspiration before proceeding to such severe operations as removal of the upper jaw.

32. DISEASES OF THE FRONTAL SINUS.

Hyperæmia of the mucous membrane lining the sinus and occurring during an attack of acute nasal catarrh has long been regarded as the explanation of the frontal discomfort so common during the latter affection, but it is only within recent years that empyema of the frontal sinus has been shown to occur with a frequency which removes it from the category of very rare diseases.

Ætiology.—Empyema, acute or chronic, is the most common of the diseases affecting the sinus and my (H. T.) experience is that acute suppuration usually follows upon an acute rhinitis often of influenzal origin or occurring in association with one of the acute specific fevers, or when the patient is surrounded by insanitary influences; while chronic empyema is more frequently due to an extension of a similar condition arising primarily in the antrum or the ethmoidal cells. The anatomical disposition of the sinuses would render such a spread of infection very possible. In other cases it

follows upon an attack of acute suppuration, while in rarer instances a severe blow on the sinuses, or intra-nasal syphilitic lesions may form the starting point of the disease.

Chronic, is more common than acute, suppuration of the frontal sinus and is frequently associated with similar disease of the other accessory sinuses, especially of the antrum and ethmoidal cells.

Morbid Anatomy. — In chronic empyema the mucous membrane of the sinus has usually undergone degenerative changes, precisely similar to those already described as occurring in chronic suppuration of the maxillary antrum, and to which the reader is referred.

33. ACUTE INFLAMMATION.

The symptoms of hyperæmia alone may be only more or less frontal pain or discomfort, which disappear with the subsidence of the intra-nasal catarrh and rarely call for treatment. Warm fomentations generally give the desired relief.

34. ACUTE SUPPURATION.

When this occurs with complete blocking of the fronto-nasal canal the patient suffers from intense headache or supra-orbital neuralgia, while redness, œdema and tenderness of the skin over the lower part of the forehead and upper eyelid may also be present. With such symptoms are combined pyrexia and corresponding constitutional disturbances. If the inflammatory products are unable to make their way into the

nose, in addition to the above symptoms, the walls of the sinus become distended, as is evidenced by external swelling or outward and downward displacement with protrusion of the eyeball.

Relief, short of surgical interference, may ultimately arise by the discharge of pus into the nose, but failing this, a subcutaneous abscess may form over the sinus; or by perforation of its posterior wall meningitis or cerebral abscess may be set up.

If, however, the fronto-nasal passage is not quite occluded, all the symptoms described may be milder and the true nature of the case only rendered probable by the presence of a purulent discharge issuing from the anterior part of the middle meatus.

Diagnosis.—Acute suppuration of the antrum, subcutaneous abscess in the lower frontal region and acute supra-orbital neuralgia, are the three conditions most liable to be mistaken for acute frontal sinus suppuration.

In the former, opacity on trans-illumination, pain on pressure over the anterior antral wall, and the result of exploration, would determine the presence of antral disease. From subcutaneous abscess a diagnosis may be impossible without an incision, a procedure which is, however, indicated in both conditions.

Neuralgia would be unaccompanied by pyrexia, while the local inflammatory symptoms are not marked, although they may be simulated by the tenderness and slight swelling which not rarely accompany neuralgia in this region.

Prognosis.—Under efficient treatment acute cases generally do well.

Treatment.—In the very early stages it may be possible to reduce the acute inflammation by hot

fomentations externally, with constant nasal inhalations of mentholised steam, as recommended by Luc. (Made by adding to a pint of boiling water, ten to fifteen drops of a 10 per cent. alcoholic solution of menthol).

Seifert has recommended as the result of successful experience, that suction should be applied to the sinus by means of an empty Politzer bag, which is applied to the nostril and allowed to suddenly expand, while the

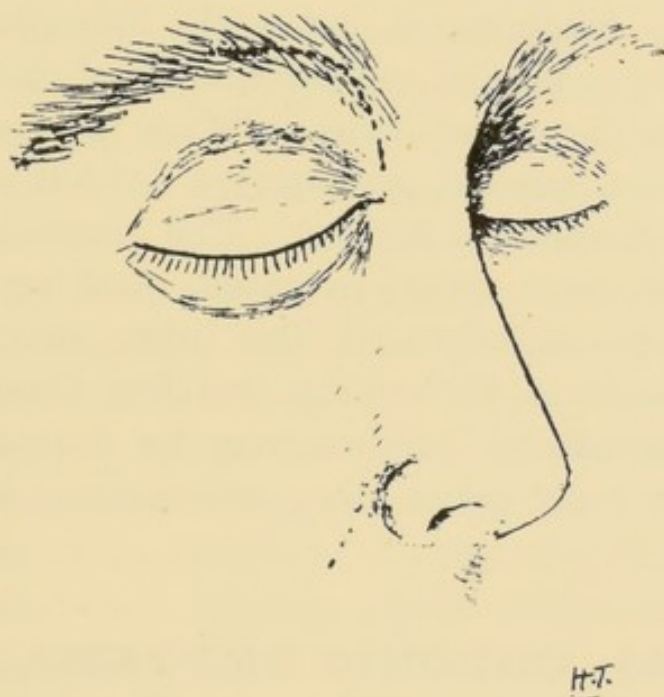


FIG. 42.—Diagram showing line of incision for opening frontal sinus.

naso-pharynx is shut off from the mouth in the act of swallowing. Both nostrils are of course closed during the expansion of the bag. If simple measures fail to relieve, the sinus should be opened from the outside.

Operation.—The eyebrow having been shaved and the skin within the area of operation rendered aseptic, an incision is made through the inner third of the line of the eyebrow curving downwards internally, to a little above the internal palpebral ligament (fig. 42).

An endeavour should be made if possible to avoid cutting the supra-orbital nerve. The soft parts and periosteum are retracted for the length of the wound, and a small disc of bone is removed from the junction of the anterior wall and the floor of the sinus by chisel and mallet, or small trephine. (For guide to sinus, see remarks on Anatomy of Sinus, p. 150). Having syringed the cavity free from pus the fronto-nasal passage should be explored by means of a stout probe in order to ensure its patency. The sinus cavity is next disinfected by mopping it out with chloride of zinc, grs. 40 ad $\frac{3}{4}$ j., or 1 in 500 perchloride of mercury solution, and finally packed with iodoform gauze. One or two superficial stitches are inserted but left untied, and an external dressing is applied. The gauze is removed in 48 hours, the sinus irrigated, and repacked for another 48 hours, when, if the lining mucous membrane is found to be healthy and free from suppuration, the superficial stitches may be drawn together. Healing generally takes place without any appreciable scar.

35. CHRONIC EMPYEMA.

Ætiology.—The relationship between this condition and a similar one of the antrum has already been referred to (p. 152).

The lower cavity may infect the higher or vice versâ, the former sequence being probably the commoner.

With regard to ethmoidal disease, since the fronto-nasal canal passes through the anterior ethmoidal cells, it would be almost impossible for a chronic suppurative process to affect these smaller thin-walled sinuses without invading the included canal, from which the spread

of infection to the frontal sinus would be rendered almost certain.

One of us (H. T.) has recently had seven cases of frontal sinus empyemata under treatment, and in each one the antrum and ethmoidal cells were similarly diseased, and the course of the disease would seem to show that the antrum was the cavity primarily at fault.

The empyema may be bilateral—five out of eleven of my cases—under which circumstances the sinuses may or may not communicate through an opening in the sinus septum. Where the fronto-nasal canal is obstructed the sinus walls may be thinned, or even perforated by distension, and in the last instance a subcutaneous abscess may burst superficially, leaving a fistulous tract into the sinus. Cases have been recorded (and are far more common than in acute empyema) where intracranial extension has taken place, terminating in meningitis, cerebral abscess, &c.; while in others the septic contents of the sinus have entered the diploë of the frontal bone, producing a spreading septic phlebitis of the diploëic veins, followed by widespread necrosis of the vault of the skull, chronic septic poisoning and death (*vide infra*).

Symptoms.—The one constant symptom is a purulent nasal discharge issuing from the anterior end of the middle meatal region, which latter is commonly the seat of unhealthy granulations or polypi. If a blunt pointed probe is passed amongst these it will often discover small areas of carious or exposed bone.

The discharge is generally non-fœtid and uninfluenced by the position in which the head is held.

Spontaneous pain, frontal headache, or supra-orbital neuralgia may or may not be present; in four consecutive cases of mine (H. T.) it had never been complained

of. Its presence or absence will probably depend on the degree of tension of the retained inflammatory products, and therefore upon the patency of the fronto-nasal canal for drainage purposes. External pressure directed upwards and inwards on the floor of the sinus will sometimes produce pain, but here again we think its presence is mainly dependent upon the tension above referred to.

No external swelling is present when there is a free discharge into the nose, but if this is never quite free and there are occasional intervals of complete obstruction, then actual thinning and distension of the bony walls may result, with visible bulging of the sinus, or even a subcutaneous abscess may form. Depression, inability to work or concentrate the mind, and that collection of symptoms known as aprosexia (*vide* Nasal Stenosis) have been noted in individual cases, while the constant swallowing of pus produces disturbances of digestion, anorexia, nausea, &c.

Diagnosis.—This is frequently difficult because a multiple suppurative sinusitis often exists, and in ethmoidal, frontal or maxillary empyema, pus in the middle meatus is a constant objective symptom. Under such circumstances we would recommend the following line of procedure. The nostril should first be cleansed so as to remove all visible pus, after which the antrum should be tested for pus by exploration and the other methods already enumerated (pp. 159, 160).

If the evidence is negative as to antral suppuration, it is obvious that the pus is coming from a higher sinus. Now the anterior ethmoidal cells and the frontal sinus are, in chronic cases, nearly always associated in the suppurative condition, and the middle meatal region is the seat of œdematous granulations and polypoid mucous

membrane. Examination of this region with a probe reveals carious spots, or loose spicules of bone, indicative of the ethmoidal disease. An attempt should next be made to explore the frontal sinus by passing into it a suitably curved probe (Hajek's) or Hartmann's frontal sinus cannula. If on their removal a free flow of pus occurs it is almost certain that the upper sinus is the seat of the discharge. Should it be possible to pass the cannula into the sinus, and upon irrigation the returning fluid contains pus, the diagnosis of frontal sinus empyema is established. The trans-illumination test as applied to this region is of less value than in the case of the antrum.

Even should the latter sinus be found to contain pus the above tests if carefully carried out may enable one to determine whether the frontal sinus is also diseased.

Many difficulties, however, present themselves. It frequently happens that it is impossible to navigate the fronto-nasal canal with probe or cannula, even after removal of the anterior end of the middle turbinate, and the diagnosis may eventually be made by the fact that suppuration from the upper regions of the nasal cavity continues, even though the antrum by careful treatment has ceased to produce pus.

Prognosis.—This depends upon the extent of the disease, the number of sinuses involved, on the efficiency and painstaking care with which preliminary intranasal treatment is carried out, the establishment of free drainage into the nose in the radical operation, and finally upon the particular form of that operation which is performed.

Treatment.—Assuming that the sinuses are concurrently diseased, or at any rate, that the antrum contains pus in its capacity as a reservoir for the dis-

charge from above, the following is the course which one of us (H. T.) has successfully followed in several cases.

The maxillary antrum is drained by the alveolar method and irrigated twice daily, while twice a week intra-nasal treatment is carried out until all granulations, polypi, and the anterior half of the middle turbinate have been removed. The middle meatus is then accessible for treatment, while an obstruction to free discharge from the frontal sinus is removed. The diseased ethmoidal cells are best dealt with by means of a curette or Gruenwald's forceps, and upon careful and thorough removal of all pathological conditions in this region depends much of the ultimate success of the external operation.

In some cases these measures are followed by complete relief of the headache and such a diminution of discharge, that it may be a question for the patient to decide, whether he is content to put up with the inconvenience of a slight purulent discharge, or, undergo an operation designed for its radical cure.

Some surgeons have obtained good results by thorough and frequent irrigation of the sinus from the nose, and then filling the cavity with iodoform emulsion while the patient lies on a couch with the head hanging over the end, so that the injected fluid remains in the sinus for half an hour or longer. I (H. T.) have given this method a full trial in four instances, and while it may have checked the suppuration, it has not cured any of my cases and could hardly be expected to do so when the lining mucous membrane of the sinus has undergone polypoid degeneration. The injections used by me were iodoform emulsion, hydrogen peroxide, Mandl's solution, ten per cent. solution of salicylic acid

in absolute alcohol, and nitrate of silver, gr. x. ad ʒj. In each case the sinus was thoroughly cleansed by boracic lotion before using the stronger injection.

Often the irrigation treatment cannot be carried out because of the impossibility of traversing the naso-frontal canal.

If in spite of intra-nasal treatment there are constant attacks of pain in or around the sinus, or any sign of distension of the same, then the external radical operation is imperatively called for. The details of this down to removing a disc of bone are similar to those advised in the operation for acute empyema. Having entered the cavity it should be explored in all directions with a probe, in order to gauge its size and ascertain if the bony wall is anywhere deficient. The opening is next freely enlarged so that the sinus can be carefully curetted and every nook and cranny explored for degenerate mucous membrane or foci of suppuration.

The fronto-nasal canal is then traversed by a probe and enlarged by suitably curved burrs* until its calibre is at least equal to that of an ordinary lead pencil. In order to gain access to its upper end, the anterior wall of the sinus must be removed close down to the junction of the frontal and nasal bones.

If the sinus be only of moderate size the whole anterior bony wall should be removed, so that the soft parts eventually rest on the posterior wall. In this way the cavity is obliterated, the radical cure is certain, and the disfigurement is scarcely noticeable. No drainage tube is necessary and one or two superficial stitches suffice to produce good union of the surface wound.

In women, and in the case of large sinuses in both

* These are made by Mayer and Meltzer, 71 Great Portland Street, W.

sexes, it may only be possible to remove a portion of the anterior bony wall because of the deformity which would otherwise result.

Under such circumstances, after the sinus has been curetted and the fronto-nasal canal rendered patent, the former should be disinfected by some strong antiseptic *e.g.*, zinc chloride, grs. 40 ad ʒj , or pure carbolic acid, and then packed with iodoform or cyanide gauze, one end of which is led out at the lower and inner angle of the wound. Only the outer end of the wound should be sutured at the close of the operation. If the temperature remains normal, pain is absent, and suppuration does not recur, the packing may be left for three or four days, when it is changed and a fresh quantity inserted, and left for a similar period. When the sinus is lined with healthy granulations, the external wound may be allowed to close, the exudation from the sinus finding its way easily into the nose. The nasal cavities should be douched with an alkaline antiseptic wash three times daily for a week or fortnight following the radical operation.

By this method a radical cure may be obtained with remarkably little disfigurement. After having carried out the "packing" operation as above described, in order to shorten the period during which the patient is under treatment and to produce more perfect results, I (H. T.) have recently applied Thiersch's method of skin grafting to the sinus with excellent results, the method being almost identical with that which is used in the mastoid operation.

Luc (Paris) inserts a large drainage tube between the sinus and the nose at the close of the operation and at the same time sutures the external wound. The upper end of the tube rests in the lower end of the

sinus, the lower end just projects from the nostril. It is retained in position by a stitch which is also used as one of the stitches for suturing the external wound. I (H. T.) have used this method with success in four cases but am inclined to think that the sinus is easily reinfected through the tube and it is difficult, if not impossible, to ensure the growth of healthy granulation tissue within the sinus. If the tube is used it should be left in for ten days to a fortnight.

Walker Downie's method is very similar to that first described only that he closes the external wound at the end of the operation and brings out one end of the gauze through a small counter opening above the inner canthus. The packing is removed between the 7th and 14th day.

Another method giving excellent results is to stitch up the wound at the end of the operation with the exception of its lower inner angle. Through this a small drainage tube with lateral perforations, corresponding to the lumen of the sinus, is passed downwards and out at the corresponding nostril. External dressings are then applied and daily removed for irrigation of the sinus from the upper end of the tube. The latter is replaced in ten days time by a piece of silver wire doubled upon itself, suitably curved, and of such a length as to pass downwards into the nose, while its upper end projects from the external wound. This keeps the fronto-nasal canal open and it can be daily removed by the patient for irrigation of the sinus. It is finally removed when the soft parts have thoroughly retracted and there is no discharge of pus from the sinus.

COMPLICATIONS.

1. *Diplopia*.—This may immediately follow the operation and is due to interference with or exudation around the pulley of the superior oblique muscle. It disappears within a fortnight or three weeks of the operation.

2. *Recurrence of suppuration with breaking down of the external wound and resulting fistula*.—This is generally due to the fact that a sufficiently free passage into the nose has not been made at the time of the operation, and the retained secretion has become infected from the nose or from a suppurating ethmoidal cell. Hence the value of careful preliminary intra-nasal treatment, and of a free passage into the nose from the sinus.

3. *Septic osteomyelitis of the frontal bone, generally fatal*.—In seven cases where this unfortunate result has been reported, inefficient drainage has been the cause. In most instances the external wound has been tightly sutured at the end of the operation, the fronto-nasal canal has become blocked, or is obstructed by a rubber tube filled with an obstructing blood-clot, and the septic contents of the sinus have been forced into the recently opened diploeic spaces of the frontal bone, inducing a spreading septic phlebitis of the diploeic veins. The onset of the condition is evidenced by headache, pyrexia, tenderness and œdema of the skin around the wound, terminating in sub-periosteal abscess. Only very free removal of the outer table of the frontal bone, in the neighbourhood of the spreading infection, can offer any hope of checking the spread of the disease.

Before leaving the subject of treatment, we mention, only to condemn, all operative procedures which have been recommended for entering the sinus from the nose.

Such methods bristle with danger even in the hands of experts, and a mere glance at the varying anatomy of these regions is sufficient to warrant our caution. Fatalities have been recorded directly due to such procedures, which, moreover, are unscientific, unsurgical, and almost impossible of success in cases where the cavity is filled with degenerate mucous membranes.

Chronic suppuration of the frontal sinus can only be satisfactorily dealt with by a free external opening, which in skilled hands is practically free from danger, and more often than not is followed by results alike gratifying to patient and surgeon.

Serous distension of the frontal sinus.—In this condition the sinus becomes distended by a thick, viscid secretion, the escape of which into the nose is prevented by some obstruction of the fronto-nasal canal. The pressure symptoms which arise are similar to those already described. If it be impossible to make free the lower end of the fronto-nasal canal, and drain the sinus from the nose by intra-nasal treatment, the swelling should be opened from the outside, and a free passage made into the nasal cavity. Strict asepsis must be observed in the operation, as suppuration is very liable to occur, rendering it necessary to reopen the wound and possibly to obliterate the sinus by removal of its anterior wall.

Osseous, sarcomatous and other tumours occasionally arise in the frontal sinus.

36. DISEASES OF THE SPHENOIDAL SINUS.

While acute catarrh of this sinus may occur in association with acute rhinitis, yet the most common condition met with clinically is that of chronic suppuration.

This may arise from those causes which, we have already stated, are productive of empyema of the other accessory cavities. Its close anatomical connection with the posterior ethmoidal cells explains the frequency with which these sinuses are associated in disease. Owing to the situation of the orifice of the sinus, purulent contents are apt to be retained under tension, the lining membrane degenerates and necrosis of the bony walls is not uncommonly the final result. The important relationships of sinus to the base of the brain and to the orbit render its morbid conditions of serious import.

Symptoms.—Deep-seated pain in the head, back of the orbit, and radiating in different directions, is usually present, accompanied by a purulent discharge into the throat and possibly from the nose. If the pus be retained under tension, ocular disturbances may be noticed, especially blindness of rapid onset, in which the peripheral field of vision is first lost (Burger), exophthalmos, and paralyse of ocular muscles.

Diagnosis.—This is rendered probable if the purulent discharge can be seen by posterior rhinoscopy issuing from the position of the naso-pharyngeal orifice of the sinus, but its common association with suppuration of the posterior ethmoidal cells often renders the diagnosis between these conditions a matter of difficulty.

Treatment.—Besides the free use of cleansing lotions for the nose and naso-pharynx, an endeavour should be made, but only in skilled hands, to wash out the sinus through its natural opening, by means of a long cannula passed through the anterior nares. Zuckerkandl advises that the direction should be upwards and backwards, crossing the junction of the

middle and posterior thirds of the middle turbinate. Obstruction caused by the middle turbinate may prevent the necessary manipulations and therefore it is wise in all cases to remove at least the anterior half of that bone in order to allow free access to the anterior surface of the sphenoid. It may then be possible to thoroughly irrigate and even curette the interior of the sinus, or establish free drainage by enlarging the natural opening.

37. DISEASES OF THE MIDDLE TURBINATE AND ETHMOIDAL CELLS.

An extensive examination of the middle turbinate bone and the neighbouring ethmoidal region in patients suffering from nasal diseases will afford many opportunities of recognising all those forms of inflammation of bone and periosteum, which occur in other regions of the body.

We cannot here discuss their pathology at any length, suffice it to say that we meet with chronic thickening of the muco-periosteum (periostitis), hyperostosis, rarefying osteitis, abscess, caries, and in very rare instances, necrosis. In hyperostosis the anterior end of the middle turbinal is enlarged, while the mucous membrane may be hypertrophied and œdematous, so that a polypus may eventually depend from it. In non-suppurative rarefying osteitis the anterior extremity appears dull and granular, and if a probe is passed amongst the granulations a rough and gritty feeling is noticed. Caries and necrosis, especially the latter, are uncommon conditions, and when present are always accompanied by suppuration. We would urge the

importance of recognising the latter point, which, however, is in direct opposition to Woakes' teaching, viz., that "necrosing ethmoiditis" is very common in patients who do not exhibit the usual symptoms of diseased bone in the nose. The overwhelming majority of rhinologists agree that "necrosing ethmoiditis" is an exceedingly rare disease, and that when it does occur in the nose it is the same pathological process and accompanied by the same symptoms as necrosis of bone in any other part of the body.

If the student uses anything sharper than a blunt or ordinary surgical probe in the nose, he will be at once led astray by feeling what is apparently "bare bone," in situations where the muco-periosteum is thin, *e.g.*, in the region of the middle meatus and anterior ethmoidal cells, and it is more than probable that most of the mistakes concerning "necrosing ethmoiditis" have been made in this way.

Of all the nasal accessory cavities the ethmoidal cells are probably the most frequently affected by the results of acute or chronic inflammation. In an attack of acute rhinitis the mucous membrane lining these cells may take a part, but it usually subsides with the general subsidence of the catarrhal process.

In other cases, especially those associated with influenza, the inflammatory exudation may be retained under tension, and the lining mucous membrane undergo polypoid degeneration, while the contents of the little sinuses may suppurate.

In the first case, the ethmoid cells are distended or partially destroyed by chronic inflammatory products, which project into the middle meatus as granulations or small polypi, and in the second instance these are associated with a purulent discharge. In course of time, owing

to a rarefying osteitis, the originally thin party-walls of the cells are represented by mere bony spicules buried in a mass of granulations, some of which have become large and œdematous and may be spoken of as polypi.

To such an extent may these inflammatory products develop, that they fill and increase the normal width of the middle meatus, so that the middle turbinate is forced against the septum, while the same pathological processes occurring in the turbinal often reduce it to a thin, softened, loosely hanging structure which is easily removed from its normal attachment to the lateral mass.

Such forms of inflammation, as have been described, may result from repeated attacks of acute rhinitis and thus comprise a form of chronic rhinitis; from extension of intra-nasal syphilis or tubercle; as a result or complication of chronic inflammatory lesions affecting neighbouring sinuses; or they may develop in connection with influenza or other acute specific infectious diseases. Under the latter circumstances a chronic suppurative inflammation is often present.

Symptoms.—When pain is experienced it may be referred to the root of the nose, lower forehead, to and around the eye, or to the temporal region. Other reflex symptoms may also be caused. In the later purulent stages of the disease, pus will be found in the middle meatus if the anterior cells are affected, or in the superior meatus, naso-pharynx, or between the septum and middle turbinal if the posterior group are diseased. In exceptional cases, pus retained under tension may cause a bulging of the os planum towards the orbit producing orbital displacement, and if it bursts into the orbital cavity a fluctuating swelling above the internal

palpebral ligament will result. This on bursting leaves a fistulous tract into or towards the nasal cavity. In many instances the frontal sinus or antral cavity becomes infected, while extension of the disease to the meninges may result in meningitis or cerebral abscess.

Treatment.—In the non-suppurative forms of ethmoiditis any marked constitutional dyscrasia should be appropriately treated, and the nostrils cleansed twice daily with warm alkaline lotions. If the middle turbinate is so enlarged as to produce symptoms of pressure on the septum, *e.g.*, sneezing fits, neuralgic pains over the nose and lower forehead, &c., it should be removed by the wire snare. Similar treatment should be accorded to an œdematous polypoid hypertrophy of the mucous membrane of the anterior extremity of the turbinal. Granulations arising in the middle meatus or on the anterior end of the middle turbinate should be curetted under cocaine, and chromic acid gently and carefully applied to the diseased area. When suppuration has occurred and inflammatory products fill the middle meatus, they must be dealt with by curette or snare, and in most cases it is excellent treatment to remove the anterior half or whole of the middle turbinate in order to gain access to the diseased cells, and to provide more efficient drainage for their morbid contents (see p. 32).

In the course of one or two sittings it may be possible to remove with forceps all the diseased ethmoidal cells until a healthy region is reached. The patient must be instructed to use a mild alkaline antiseptic wash during the intervals of his visits to the surgeon. In many cases, however, especially with extensive ethmoidal suppuration, such treatment is very prolonged and wearisome, and it is better to thoroughly curette the

region while the patient is under a general anæsthetic. In this way the disease can be effectually dealt with and in skilled hands the danger is very small. The results are excellent and the saving of time to patient and surgeon constitutes a great advantage over the first method.

38. CYSTS OF THE MIDDLE TURBINATE BONE.

These would seem to be one of the results of chronic inflammatory changes affecting the bone, as a result of which there is a distension of one or more of the bony cells normally found in this region. The cysts vary in size from a pea to a small walnut. Their contents may be clear and viscid, or as in a case recently removed by one of us (H. T.) purulent, while the lining membrane consists of smooth epithelium or, as in the case referred to, it undergoes a polypoid degeneration. The external mucous membrane covering the cyst is frequently hypertrophied and œdematous, so that it resembles, and is in fact, a form of polypus.

Symptoms.—If the cyst be small it may produce no symptoms, on the other hand the chronic inflammatory changes occurring in it have seemed, in certain cases, to form the starting point of reflex symptoms, in that removal of the enlargement has been followed by relief of sneezing, cough, hay asthma, &c.

When the cyst is large and presses against the septum, complaint may be made of nasal obstruction, loss of smell, pain over the bridge of nose, and those other reflex symptoms which have already been referred to.

In some instances there has been an excessive discharge of clear fluid from the nose which the patient ascribes to a "chronic cold."

Diagnosis.—Cyst of the middle turbinal may be distinguished from a large polypus by its immobility, and its hardness.

Treatment.—If there be reason for thinking that the cystic swelling of the bone is sufficient to account for the symptoms complained of, the former should be removed by scissors and cold wire snare in the manner already described for removal of the middle turbinate (p. 32). The hæmorrhage is usually slight. The raw surface should be packed with iodoform or cyanide gauze for 48 hours. If any of the cyst wall should be left behind it can be dealt with subsequently by means of Gruenwald's forceps.

39. THE ANATOMY OF THE PHARYNGEAL TONSIL.

In the upper and central region of the naso-pharynx is a soft mass of adenoid tissue, to which the name of pharyngeal tonsil, the tonsil of Luschka, or the third tonsil, has been applied. It is normally present in infants and young children, but tends to diminish in size with increasing years, so that all but a trace of the gland tissue may have disappeared even before puberty. On the other hand a morbid hypertrophy of this structure produces the condition known as adenoids, or post-nasal growths. This tissue is about a quarter of an inch in thickness, and covers the whole extent of the under surface of the basilar process of the occipital bone. Vertical clefts of varying depths tra-

verse the glandular tissue, giving to it a foliated aspect, while less marked transverse fissures lead to the formation of small pits and depressions. In the median line at the lower border of the tonsil is usually found a depression of the mucosa, which often leads into a narrow sinus terminating blindly at the upper end of the mass, in which secretions may collect. Tornwaldt regarded it as a special anatomical formation, but Schwabach has shown that it is nothing but the remnant of the middle cleft of embryonic life.

40. DISEASES OF THE PHARYNGEAL TONSIL AND NASO-PHARYNX.

The pharyngeal tonsil may be attacked by precisely the same diseases as attack the faucial tonsils, *i.e.*, there may be parenchymatous or follicular inflammation, and it may be the seat of syphilis or diphtheria. I (F. de H. H.) have seen severe follicular inflammation of the pharyngeal tonsil as a sequel of influenza.

Fourteen cases of primary syphilis of the naso-pharynx have been recorded. In every case infection has been conveyed by the Eustachian catheter. Secondary syphilitic affections of the naso-pharynx occur more frequently than is commonly supposed.

Occasionally, tertiary syphilis or diphtheria may be localised in the naso-pharynx, usually on the pharyngeal tonsil, without any recognisable change in the oropharynx. It is sufficient to direct attention to the possibility of these conditions, in order to lead to a careful posterior rhinoscopic examination in suspicious cases.

Treatment.—The general treatment of the simpler

cases is the same as for corresponding affections of the faucial tonsils; specific affections would demand their usual treatment.

41. NASO-PHARYNGEAL CATARRH.

This affection manifests itself in the acute and chronic form.

Acute Naso-pharyngitis.—This occurs as a part of the general catarrhal inflammation occurring in acute rhinitis, but in certain instances the brunt of the disease seems to fall mainly on the pharyngeal tonsil. The causes inducing the inflammation are similar to those productive of acute nasal catarrh. The naso-pharyngeal mucous membrane and especially the remains of the median glandular mass, become red and swollen, and the initial arrest of secretion soon gives place to the discharge of a mucous secretion, which finally becomes muco-purulent.

The patient at first complains of malaise, headache, heat, dryness, and discomfort at the back of the nose, with some discomfort on swallowing. These symptoms soon give way to the annoyance caused by accumulations of secretion in the naso-pharynx, which are difficult to dislodge, and when swallowed in any quantity are apt to induce slight gastric symptoms. In many instances earache, tinnitus and deafness add to the general discomfort.

Treatment.—An efficient saline purgative should be administered at the commencement of symptoms. The patient should remain in a warm room and adopt the general line of treatment recommended for acute rhinitis (p. 12). When the discharge commences free

nasal douching with a warm alkaline wash (*e.g.*, equal parts of borax, salt, and bicarbonate of sodium, ʒj., ad Oj.) twice or thrice daily gives great relief and hastens resolution of the catarrhal process.

Chronic Naso-pharyngitis.—This frequently occurs in connection with chronic rhinitis, and probably both are due to the same causes, among the more important of which are constantly recurring attacks of acute rhinitis, nasal obstruction in all its forms, the fibrous remains of old adenoid growths, abuse of alcohol, inhaling tobacco smoke, strumous and gouty diatheses, and irritating atmospheres. Tornwaldt, however, looked upon the pharyngeal bursa as the source of naso-pharyngeal catarrh and though this is true in some instances, a broader view of the etiology of naso-pharyngeal catarrh is the correct one.

Symptoms.—The main symptom is that of an excessive muco-purulent secretion, which necessitates constant hawking and sniffing to dislodge it. This is particularly worse in the early morning, when the drying of the secretion during sleep causes the maximum of discomfort on waking. It is then not uncommon for patients to retch or even vomit in their efforts to clear the naso-pharynx. The spread of the catarrh laterally may induce deafness, tinnitus, and other ear symptoms, while pharyngitis and even laryngitis often represent the extension of the catarrh downwards. Headache, mental apathy and other reflexes may be present.

Posterior rhinoscopy reveals a general swelling and thickening of the mucous membrane, which is more marked in the median line if there are remains of Luschka's tonsil.

The hypertrophy may extend laterally and down-

wards towards the pharynx, which is often red, glazed, and covered with a thin veneer of inspissated mucus, while the lateral pharyngeal bands stand out prominently. The secretion in the naso-pharynx is excessive, viscid, muco-purulent, and sometimes dried almost to a crust. It may line the space generally, when it might be mistaken for a purulent discharge from the sphenoidal or ethmoidal sinuses, or possibly it will be limited to the area around the pharyngeal bursa, in which latter case it is sometimes spoken of as "Tornwaldt's disease."

In exceptional instances of the latter, the bursal orifice becomes occluded, and with continued inflammation, a chronic submucous abscess results, which produces a deadening of the voice, slight nasal obstruction, headache, &c. When the secretion is not purulent a cyst may form, giving rise to somewhat similar symptoms.

Treatment.—Any of the general causes cited as ætiological factors should be looked for and treated. We would lay especial stress upon the morbid remains of old adenoids, chronic rhinitis, nasal obstruction, alcohol, and tobacco in excess. In recent cases a warm alkaline douche, used at least twice daily, will sure to benefit, and its efficacy will often be enhanced by the addition of listerine, ʒij. to ʒiv. of the lotion. In more chronic cases, after the primary cleansing, an application of iodine pigment (formula No. 45) to the naso-pharynx is often extremely useful. This is best made by twisting some absorbent wool soaked in the pigment round a suitably curved naso-pharyngeal probe. Others prefer nitrate of silver, gr. x. to xv. ad ʒj. or zinc chloride, gr. 30 ad ʒj.

Such applications should be made twice or thrice weekly according to the needs of the case.

When there is a marked hypertrophy of the tissues, and especially if there are any old adenoid remains, the only efficient treatment is removal of the same by curettage or post-nasal forceps, the latter are generally preferable because of the toughness of the morbid tissue.

If the galvano-cautery, chromic acid, or nitrate of silver be applied to this space they need constant applications, and in the end do not give such good results as actual removal of the diseased tissue, added to which the use of the cautery is often followed by unpleasant constitutional symptoms, pyrexia, &c.

Where a cyst or submucous abscess is present it can usually be effectively dealt with by means of the post-nasal currette (Gottstein's) or forceps (*vide infra*). In the absence of instruments, the nail of the index-finger forms a fairly efficient substitute.

42. ADENOID VEGETATIONS.

Hypertrophy of the adenoid tissue, normally existing in the naso-pharynx of young children.

Ætiology.—We have no exact knowledge as to the cause of this hypertrophy. It is pre-eminently an affection of childhood, in which rich and poor suffer alike. Whether adenoids are congenital is uncertain, but it is indisputable that they may produce symptoms in the very early months of infant life. They are, perhaps, most common from five to twelve years of age, tending to disappear naturally at puberty, but should they fail to do so symptoms of their presence may be found in young adults up to thirty years of age, or in rare instances even longer than this. As regards sex, boys are more frequently affected than girls, and the

disease is often found in more than one member of the same family. The acute infectious fevers, especially measles, often seem to act as the exciting cause of the abnormal hypertrophy, possibly due to an absorption of septic matter by the lymphoid tissue. Adenoid vegetations are usually well marked in cases of cleft palate, and this is possibly due to the direct irritation of food and cold air. Nasal obstruction, chronic rhinitis, and struma, also seem to favour the production of these post-nasal growths. They are met with in nearly all climates, but a damp and cold atmosphere is certainly a predisposing cause. Massei remarks, for example, that adenoid vegetations are quite rare in Italy, and that those found seldom present extensive development.

Morbid Anatomy and Pathology.—It must not be forgotten that in the naso-pharynx of all young children there is normally a small amount of adenoid tissue (Luschka's tonsil), which tends to diminish with increasing years, and it is only when this structure hypertrophies to such an extent as to produce symptoms, that we can look upon it as a morbid growth. In the less severe forms of the disease the growth may be confined to the roof of the naso-pharyngeal cavity, and produce little or no evidence of its presence. In the severe forms the vegetations are very numerous, large and irregular, and are not confined to the roof of the cavity, but extend to the lateral walls, grow from the fossa of Rosenmueller, and even cover the orifices of the Eustachian tubes, while at the same time they may occlude the greater portion of the posterior choanæ. When seen by posterior rhinoscopy the vertical clefts (p. 200) sometimes give to it an appearance not unlike a cock's comb. In structure, they are similar to the faucial tonsils and to the granulations seen on the

posterior wall of the pharynx in cases of granular pharyngitis; in fact these conditions are very commonly associated in the same individual, in whom also there may be an hypertrophy of the adenoid tissue at the base of the tongue—the so-called lingual tonsil. The surface of the vegetations is covered by columnar ciliated epithelium. The substance of the tumours is composed of lymphoid tissue, *i.e.*, a delicate reticulum, within the meshes of which are contained lymph corpuscles. The adenoid vegetations of adults only differ from those met with in children, in being of a somewhat firmer consistence, *i.e.*, they have undergone a fibrous change.

Recent observations by Woodhead and others have shewn that adenoids may be the seat of primary infection by the tubercle bacillus, while Nichol, in an analysis of 500 cases of enlarged cervical glands, believes 80 per cent. of them are due to tuberculous infection from the tonsils and naso-pharyngeal mucous membrane. The practical and far reaching importance of such observations cannot be over-estimated.

Symptoms.—A child suffering from extensive adenoids can at once be detected by the practised eye. The face is long, the point of the nose pinched, the lower jaw hangs down, the mouth is open, there is often lateral narrowing of the alveolar arch, high palate, and prominence of the permanent upper incisor teeth, which tend to approach one another posteriorly, the upper lip projects away from the teeth, the inner canthus of the eyes are drawn downwards, the eyebrows raised, while the obliteration of the natural folds of the face gives to the patient a stupid, vacant, semi-idiotic expression.

Two symptoms stand out conspicuously in all cases of extensive adenoids, viz., nasal obstruction and deaf-

ness. The former gives rise to mouth-breathing during the day, accompanied by all its evils, such as pharyngeal, laryngeal, and bronchial irritation or catarrh. A hacking cough is often complained of, especially on first lying down at night. A suckling child takes the breast with difficulty, its frequent suffocative attacks are a constant source of anxiety, while an older child breathes noisily, especially when eating. As the nasal mucous membrane is often in a state of catarrh, and the nose cannot be properly blown, the secretions accumulate and the nostrils are constantly wet and consequently the patient is said to be "always suffering from colds." A bilateral muco-purulent nasal discharge should always suggest adenoids in young children; as they grow older naso-pharyngeal catarrh becomes the more prominent symptom. At night snoring is an almost constant symptom, while sleep is rendered restless owing to suffocative attacks produced by secretion dropping into the pharynx and larynx.

Dreaming, nightmare, and night terrors are by no means unfrequent results of adenoids and are possibly due to defective oxygenation of the blood caused by the growths.

The speech is rendered dead and toneless, with an inability to pronounce the nasal consonants. Stammering and stuttering have in several cases been completely cured by removal of adenoid vegetations. The obstructed respiration in many cases leads to imperfect chest development.

Deafness.—We probably do not overstep the mark in asserting that over 90 per cent. of the cases of deafness occurring in young children are due to the presence of post-nasal growths. If they are present in very early

life, deaf-mutism or various forms of defective articulation may result, only to disappear after the growths are removed. In older children the deafness may be due to a temporary Eustachian catarrh, which passes off in bright and dry, but recurs with damp or moist weather, or whenever a slight cold is caught. Associated with or preceding the deafness, earache and acute or chronic suppurative otorrhœa are common, and when the latter condition is allowed to progress untreated the possible serious mastoid and intra-cranial complications are too well known to need more than passing reference.

It should be remembered that adenoids occasionally produce epistaxis, or the blood may drop into the larynx and be coughed up so that a suspicion of hæmoptysis is aroused.

Mentally the subjects of adenoids are often dull and listless, and have "none of the life of other children." At school they are possibly backward and are punished for inattention or failure in preparing their lessons, nor are they interested in the games of the playground. If they are bright and intelligent, temporary fits of dullness demonstrate that something is wrong. Often the supposed inattention is due to deafness, while the other symptoms are possibly due to lymphatic obstruction or imperfect oxygenation of the blood. Such symptoms are often associated with anæmia, anorexia, enlarged cervical glands, and a general deficiency of vitality. Finally, asthma, convulsions, nocturnal enuresis, ocular defects, and other remoter symptoms have immediately disappeared on the removal of adenoids.

For further general symptoms produced by adenoid vegetations, reference should be made to the section on Nasal Stenosis.

If the adenoid vegetations are allowed to remain,

they usually atrophy about the age of puberty, but unfortunately not until irreparable damage has, too frequently, been done. The long face and the underhung jaw are the outward manifestations of the disease. The voice remains thick, and the patient has a tendency to naso-pharyngeal and laryngeal catarrh. The most serious sequela, however, is deafness, which results from the chronic catarrh of the Eustachian tubes, set up by the presence of these growths.

Diagnosis.—In a typical case, the appearance of the

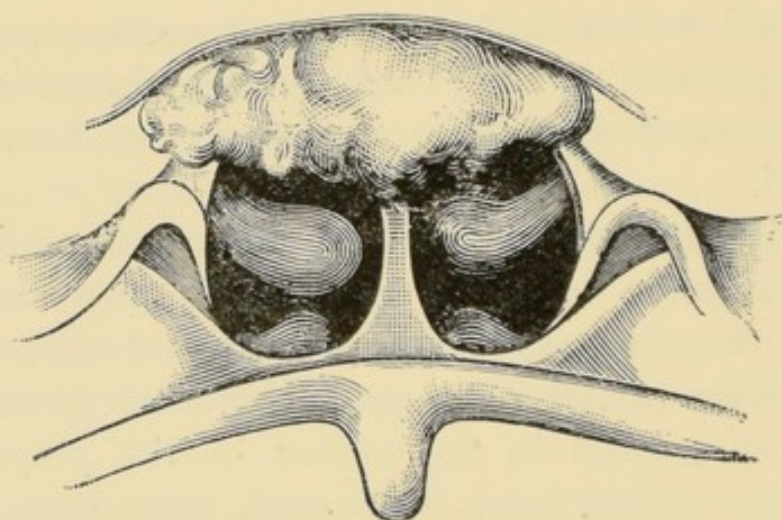


FIG. 43.—Adenoid Vegetations.

patient, and mouth-breathing and snoring at night, are sufficient to establish the nature of the case. In many patients, the diagnosis can be confirmed by the use of the rhinoscope. The naso-pharynx will be seen occupied by an irregularly lobulated mass or masses blocking up the choanæ, and preventing the posterior aspect of the septum being seen. If the rhinoscope cannot be used satisfactorily, the finger should be passed up behind the soft palate, when it comes upon a mass which feels like a bag of worms. During this examination unless the patient is anæsthetised and has a gag in

the mouth, the finger should be protected from being bitten by a leather guard.

Prognosis.—The harmful effect of leaving the nasopharynx blocked up with these growths is so certain, and the success attending their removal so great, that an operation which is almost without risk can confidently be advised. If the vegetations are thoroughly removed under an anæsthetic, there is no likelihood of a recurrence; when this seems to occur, it is generally due to the growth having been imperfectly removed, and the portions left behind sprouting afresh. There is some ground for believing that the presence of adenoid vegetations increases the risk of catching the acute specific diseases, and still more for the view that they are a potent cause of ear trouble in measles and scarlet fever. The possibility of their being the primary seat of infection of the tubercle bacillus, and their important relationship to enlarged cervical glands have already been referred to.

Treatment.—Whilst it has taken over thirty years for the general body of the medical profession to recognise the importance of the evils produced by adenoid growths, there is at the present time a need of caution lest our enthusiasm in the matter of dealing with them lead to unnecessary and even unjustifiable operating on the post-nasal space in children; and this, moreover, for all sorts of symptoms which by any stretch of the imagination can be supposed to originate in adenoid growths. We would record it as our opinion that no operation should be performed unless such growths produce some definite symptoms of their presence, and we do so the more because the natural lymphoid tissue in this region tends to disappear with increasing age.

On the other hand, deafness, earache, aural discharge,

nasal obstruction with its many manifestations by day or night, nasal, laryngeal, or bronchial catarrh with such reflex manifestations as asthma, convulsions, laryngismus, &c., *may* call for prompt and efficient treatment. Children under puberty generally bear the operation well, whereas the constitutional after effects are most marked in young adults. As a general rule adenoids may be removed at any time of the year, provided due precautions are taken to exclude exposure to cold or sudden changes of temperature after the operation. Unless urgent the operation should be postponed in case of any prevailing epidemic such as scarlet fever, measles, diphtheria, or influenza, for recorded cases show that the wound produced by the operation affords an excellent absorbent surface for infection.

The sanitary surroundings of the house in which the operation is performed should be above suspicion. Two cases of adenoids were operated on in one house, both were followed by acute symptoms of septic poisoning, one child died and the second barely escaped with his life. It was shown that the air in the room was contaminated by a large escape of sewer gas.

As regards the instruments used for the removal of adenoid vegetations, they may be divided into forceps, curettes, ring knives, and artificial nails.

Various methods of operating for adenoids have been devised, each operator naturally extolling that instrument and position of the patient to which he has become accustomed. A difference of opinion exists as to the choice of an anæsthetic. In this country nearly all operators agree that general anæsthesia is as wise as it is humane. To operate on a nervous child without an anæsthetic may possibly result in upsetting its nervous system for years. If a skilled anæsthetist is

available and adenoids alone exist, and the patient is not unduly nervous "nitrous oxide gas" or "gas and oxygen" will suffice. This gives ample time for the operation with some modification of Gottstein's curette and a final search with the index finger. If the patient is very nervous or very young, chloroform is much less alarming, and is followed by less hæmorrhage than "gas" alone. Where tonsils and adenoids are to be removed, an expert operator with a skilled anæsthetist can do quite well with "gas" or "gas and oxygen," bearing in mind the reservations already referred to as to temperament and age of patient.

If for any reason a little extra time be necessary "gas and ether" form the safest anæsthesia. If unskilled assistance only be available, chloroform is generally better given than any other anæsthetic needing complicated apparatus, and special training or experience in the use of the same. Where the operator uses "forceps" in the removal of adenoids, the operation takes longer than when a curette is used, and he will probably need "chloroform" or "gas and ether," of which, the latter is the safer, but followed by rather freer hæmorrhage than the former.

The night before the operation it is well to give a simple aperient. The position of the patient during the operation is a matter of great importance. I (H. T.) prefer that, as soon as the patient is anæsthetised, the head be allowed to hang over the end of the table. In this position it is almost impossible for blood or a fragment of growth to enter the larynx, and although the hæmorrhage may be a little freer in this position, the operation is so quickly accomplished with a curette and the head then placed in a natural position that any objections raised against this method must

have little weight. Butlin who operates with forceps prefers the patient lying on the side, thighs flexed and head a little forward on a low pillow.

Loewenburg may be considered the introducer of the forceps, and all the recently devised forceps are constructed on the same plan, but they are usually much shorter in the shanks, a device which renders them easier of manipulation while they do not rob the

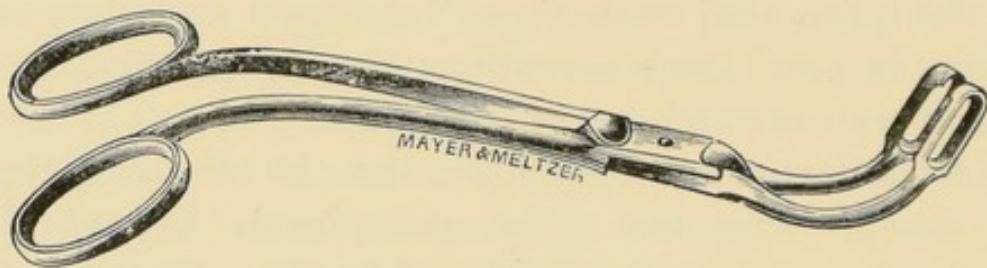


FIG. 44.—Jurac's Modified Post-Nasal Forceps.

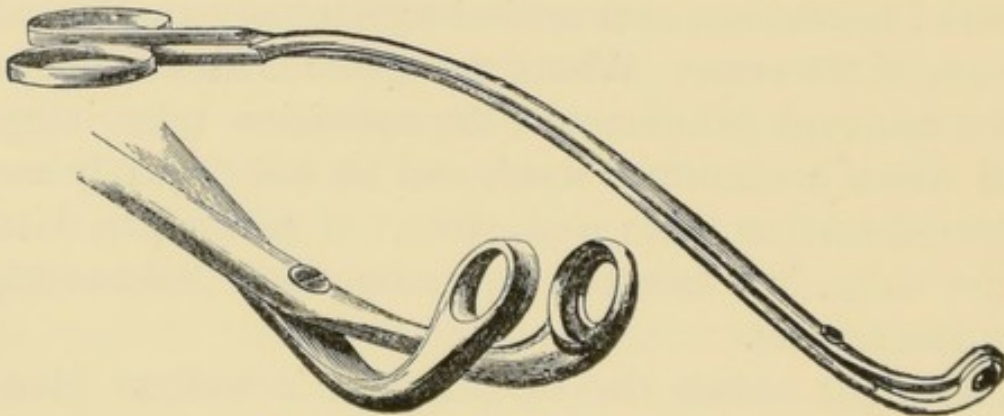


FIG. 45.—Mark Hovell's Forceps.

operator of so much of the tactile sense as do the longer instruments. Excellent forceps are Jurac's modified by Thomson, or Hovell's punch forceps.

The forceps are passed up behind the soft palate, under the guidance of the left index finger, care being taken not to injure the uvula. The growth is seized and torn away piecemeal. No great force is required to effect this. The forceps should not be directed too

far forwards, otherwise the septum may be injured. After the bulk of the growth has been removed by the forceps, the remainder can be scraped away with the finger-nail.

Should the tonsils be enlarged, they may be removed, at the commencement of the operation, by the ordinary guillotine. The hæmorrhage which follows the operation for the removal of adenoids is usually profuse for a moment or two, but as a rule subsides very quickly after the operation is completed, and under ordinary circumstances does not require checking during the operation. Exceptions, however, occur, and fatal cases of primary and secondary hæmorrhage have been recorded. Such an accident occurs most frequently in young adults after the use of forceps, where a part of the normal mucous membrane has been torn down or where the removal of growths has been incomplete. In such cases hot astringent injections may be tried, and all else failing, a post-nasal aseptic plug must be inserted. A considerable quantity of blood is often swallowed, during or immediately following the operation, and vomited as the patient recovers from the anæsthetic. The friends should be warned of this, lest they imagine hæmorrhage is going on after the surgeon has left. The patient should be put to bed in a darkened room, protected from draughts, and encouraged to sleep. For the first three or four hours after the operation, he should have nothing but small pieces of ice to suck. Later on, he may have some milk to drink. The next day, beef-tea and milk pudding may be ordered; and after this he may gradually return to his ordinary diet. In cold weather it will be well to keep the child in one room for five or six days. In warm weather two or three days may be sufficient,

great care should be taken not to expose the patient to cold or draught, on account of the danger of setting up otitis media. No syringing, or any treatment of the kind, is needed after the operation, unless the discharge from the nostrils becomes offensive, and then iodoform should be insufflated. Should oral breathing persist after the operation, tying up the jaw at night, or Guye's contra-respirator, may be tried.

In the great majority of cases, the result of the operation is to cause an almost immediate improvement in the speech and breathing; but occasionally the phonetic imperfections, which accompanies the presence of adenoid vegetations, persists after their removal. This is particularly the case with older patients who have become addicted to their bad habits. Meyer attributes this result to paresis of the soft palate, and in one case complete cure was only obtained in a year's time. Such a consummation may be greatly hastened by systematic training of the voice and perseverance on the part of the patient.

Follicular tonsillitis has been observed in a few cases, coming on soon after the operation. Traumatic fever, erysipelas, and otitis media, have all been met with as sequelæ of the operation; but, with strict antiseptic precautions, and keeping the patient protected against draughts and sudden changes of temperature, these complications may almost certainly be prevented.

A brief description of the three other methods of removing adenoids will suffice:—

Many surgeons now use some modification of Gottstein's curette (fig. 46), *e.g.*, Delstanche's, in which the cage and hooks almost invariably retain the growth so that it does not slip back into the pharynx as is liable to happen with the unguarded instrument.

The bent end of such a curette is passed well up to the roof of the naso-pharynx until it touches the upper end of the vomer, it is then brought down over the posterior surface of the naso-pharynx with a sweeping movement during which it shaves off the abnormal

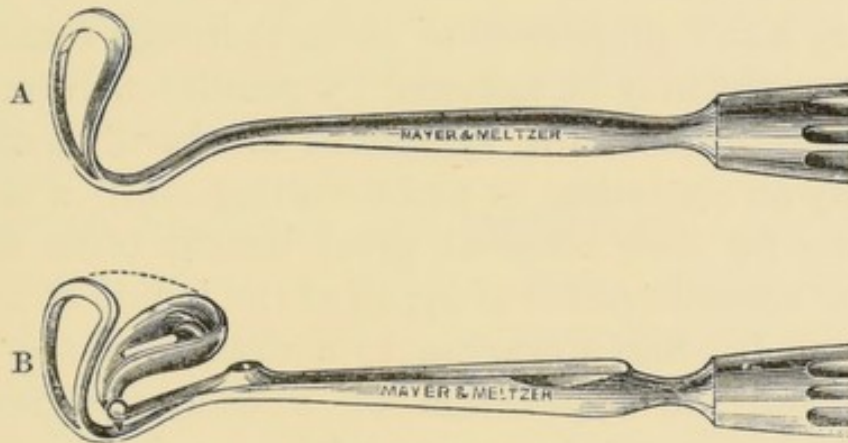


FIG. 46.—A. Gottstein's Curette. B. Delstanche's Curette.

growth. The little irregularities such as occur in the neighbourhood of Rosenmueller's fossæ can then be scraped off with the index finger. Hartmann's instrument works from side to side instead of antero-posteriorly as Gottstein's.

Meyer's ring-knife is passed through the nostril and



FIG. 47.—Meyer's Ring-Knife.

guided by the left index finger into the post-nasal space. It is less used than the other methods already described.

The steel nail recommended by Dalby, or the modification suggested by Black, are employed by a few operators, while other surgeons prefer the use of the natural finger nail for the removal of adenoids. We

consider these methods exceedingly unsatisfactory, as it is almost impossible not to leave some "tags" of adenoid tissue behind, and in such remnants we have the explanation of most of the cases of so-called "recurrence," but which would more accurately be designated "inefficient removal." We, however, do not deny that in a very small proportion of cases thorough removal of these growths may be followed by genuine recurrence.

In cases in which the symptoms are hardly sufficient to justify an operation, or while waiting until a favourable time for their removal, great benefit often results from the administration of syrup of the iodide of iron in full doses, *i.e.*, half a drachm to a drachm, three times a day, and the application of a dilute preparation of iodine (formula No. 45), with a suitably curved brush, to the naso-pharynx. At the same time the child should be taught to practice breathing through the nose.

43. NON-MALIGNANT NEW GROWTHS OF THE NASO-PHARYNX.

The most recent statistics on the subject of naso-pharyngeal polypi are those collected by Groenbech. Under this head, he groups cases of fibroma and sarcoma, and transition forms, such as fibro-sarcoma and fibro-myxoma; myxoma and enchondroma occur but rarely. If, however, as Walsham points out, any growth occupying the naso-pharynx is included under the head of naso-pharyngeal polypus, then the soft or gelatinous polypus will be found to occur more frequently than would appear from Groenbech's figures.

Ætiology.—At one time it was supposed that

females were almost free from this disease. Groenbech's figures, however, show that this is not the case, as among the 41 patients suffering from fibromata there were five women. The period of puberty is the age at which they most frequently occur. In 28 cases out of 41, the tumours began between the ages of 12 and 23.

The causation of these growths is wrapped in obscurity, and no explanation is forthcoming as to why males are attacked so much more frequently than females.

Morbid Anatomy and Pathology.—According to Groenbech, these tumours always spring from the lateral parts of the roof of the naso-pharynx, and never from the middle line.

The tumours are often exceedingly vascular, hence the occurrence and persistence of spontaneous hæmorrhages. Microscopically they consist of fibrous tissue among the fibres of which flattened cells are found. Traversing the growth in all directions are large dilated vessels, which give rise to free hæmorrhage if ulceration occurs, or when operative interference is adopted.

Symptoms.—The symptom which usually first attracts attention is the obstruction in the nose which the tumour produces in its growth, with all the consequences which result from it. When they grow larger, dysphagia and dyspnœa become troublesome symptoms. Drowsiness and sleepiness are frequently met with. As already mentioned, spontaneous hæmorrhages are common. Fatty degeneration of the heart is said to be an occasional complication. There is great difficulty, clinically, in deciding whether the growth has extended into the cranial cavity, because, on the one hand, cases in which no such extension had taken place were accompanied with cerebral symptoms,

while on the other hand, there were cases without cerebral symptoms, notwithstanding the fact that the tumour had perforated the skull.

By anterior rhinoscopy, prolongations of the tumour into the nostril may be seen, and they may be mistaken for mucous polypi, especially as tumours growing from the posterior nasal opening are of a transitional form. By posterior rhinoscopy, the naso-pharynx is seen to be more or less occupied by a tumour, which is generally of a pale red or pink colour, smooth and elastic to the touch. In some instances, the tumour attains such a size that it may be visible below the soft palate, and pushes the latter forwards, so that on opening the mouth the palate appears as an almost vertical partition about an inch and a half behind the front teeth. On introducing the finger behind the soft palate, the attachment of the tumour may be made out, unless it is so large as to completely occupy one side of the naso-pharynx.

Prognosis.—If left alone these cases are, sooner or later, almost invariably fatal from hæmorrhage, asphyxiation, malnutrition, or extension to the brain.

Treatment.—If the tumour be of moderate size and pedunculated, an endeavour should be made, under general anæsthesia, to snare it with a cold wire loop, passed through the nose and guided over the growth by the finger in the naso-pharynx. With a powerful snare this may often be accomplished, and ample time should be taken in screwing up the instrument. The real difficulty is not the size of the tumour, but its place of origin. A polypus extending in a lateral direction from the pterygoid process will give rise to great difficulties in endeavouring to snare it. Some advise the galvano-caustic loop used in this way, but it has many disadvantages, *e.g.*, overheating and snapping of the wire when electrical

resistance is too great. At the Golden Square Throat Hospital, the following method has been found very successful when the tumour was too large for a snare. A preliminary laryngotomy is performed either immediately, or a day or two, before the removal of the growth. A large sponge is then passed down to the upper end of the larynx to prevent any blood passing into the lungs. The soft palate is next divided and, if necessary, some of the hard palate is removed. A full view of the growth and its attachments is thus obtained, and by means of vulsellum forceps, scissors, and raspatory, the tumour is removed from its attachments. Finally, the soft palate is united by a few silver wire sutures. The hæmorrhage is often very free, but it can be controlled by pressure, and the advantage of having a good view of the field of operation is inestimable. If hæmorrhage cannot be entirely checked, then the stump of the pedicle, or the post-nasal space must be tightly packed with antiseptic gauze. Suppuration often occurs for several days and the stitches in the soft palate may one or all give way, but later on the edges of the wound can be freshened and union brought about.

Electrolysis has been strongly recommended by Groenbech who records 17 cures out of 32 cases treated in this way by different operators.

Among the other non-malignant growths occurring in the naso-pharynx is *adenoma*. McKenzie Johnston describes a case in a boy of thirteen, associated with mouth-breathing, deafness, liability to colds and asthmatic attacks. He removed the growth, bit by bit, with the cutting forceps. The boy lost all his former troubles, including the asthma, and a year later he was in excellent condition.

Cysts may occur in the naso-pharynx. They vary in size from a pea to a filbert nut, and contain a viscous liquid, resembling that met with in colloid cysts. They probably result from the degeneration of old adenoid vegetations or glands, or from inflammatory occlusion of the opening of the pharyngeal bursa, and they must be differentiated from vegetations and myxomata. The smaller cysts may be treated by the galvano-cautery; the larger ones must be extirpated with forceps or curette.

A congenital hairy polypus, an autochthonous teratoma, has been met with in the naso-pharynx.

44. MALIGNANT NEW GROWTHS OF THE NASO-PHARYNX.

The usual form of malignant disease in the naso-pharynx is sarcoma. Two cases of epithelioma have recently been shown before the London Laryngological Society. Nothing is definitely known as to the causation of these growths; in some cases, there is evidence in favour of their being the result of the transformation of what was originally a benign new formation.

The **symptoms** produced by the presence of a sarcoma differ in no material respect from those met with in other tumours of the naso-pharynx; possibly the hæmorrhage may be a little more frequent, and the pain more intense. The rapidity of their growth is, however, somewhat characteristic, and an enlargement of the sub-maxillary glands is generally present in epithelioma. Neither rhinoscopic examination, nor investigation with the finger, affords any very certain

means of diagnosis, although the hardness of the ulcerated surface is very suggestive of epithelioma.

Clutton reports a case in which he removed the tumour by means of a strong wire snare introduced through the nostril; the base was freely attacked with a sharp spoon. As there was evidence of recurrence a month later, the cavity in the basilar process of the occipital bone was enlarged, and masses of soft growth scooped away. The vomer and the rostrum were broken away with Loewenberg's forceps, and more of the same growth scraped away. No recurrence had taken place two years after the last operation.

PART II.

DISEASES OF THE PHARYNX.

1. EXAMINATION OF THE PHARYNX.

For the purpose of making a complete and satisfactory examination of the pharynx, it is advisable to use the light and reflector described in Part III., Section 1, and the patient should be placed in the same position as for the examination of the larynx. He should be told to open the mouth and to take a short inspiration; if a sufficient view is not obtained by this means, the tongue should be depressed by a suitable instrument. For some purposes, Turck's answers well, and it is very convenient for operations about the mouth, as the patient can keep his own tongue down with it. For general use, the ordinary folding tongue-depressor, Fraenkel's (p. 6), or Lack's (fig. 48) is to be recommended. Whatever instrument be employed, the pressure on the tongue should be gentle at first, and only gradually increased. Anything like violence causes the tongue to contract and arch up, and thus prevents a view of the pharynx being obtained, whereas the resistance of the tongue is almost always overcome by gentle and continuous pressure. The examination of the mouth and pharynx should be conducted in a methodical manner. In the first place, any alteration

in the colour of the parts should be noted ; then attention should be directed to the mobility of the soft palate and tongue, the power of contraction of the former being best tested by making the patient say "ah" while the tongue is depressed with the spatula ; finally, the

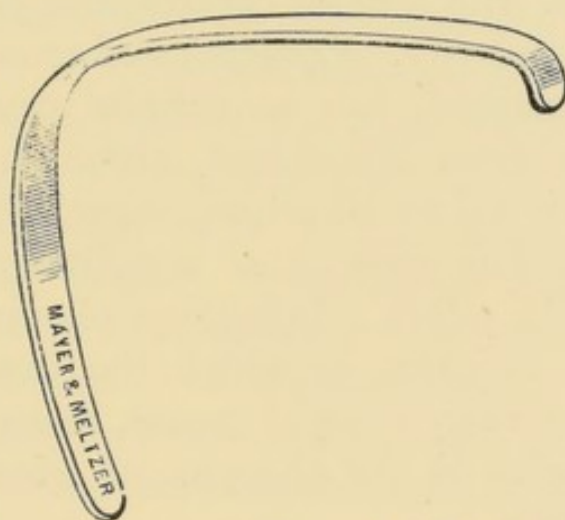


FIG. 48.—Lack's Tongue Depressor. One end is used for laryngoscopy in children ; the other as an ordinary tongue depressor. (Made in two sizes).

condition of the tonsils, as regards size and shape, the presence or absence of granules on the posterior wall of the pharynx, and the existence of any kind of ulceration or new growth in the pharynx, should be noted.

The examination of the deeper parts of the pharynx requires the use of the laryngoscope.

2. ACUTE PHARYNGITIS.

Acute Pharyngeal Catarrh.

This is an acute inflammatory affection of the pharynx and adjacent parts.

Ætiology.—As predisposing causes of acute pharyngitis may be enumerated the rheumatic or gouty diathesis, a strumous inheritance, errors of diet—especially

over-feeding, excess of alcohol, and a sedentary life. Chronic nasal obstruction by necessitating mouth-breathing must also be regarded as a predisposing factor in the production of acute pharyngitis. The most common exciting cause is a chill; or the disease may commence with a nasal catarrh, the pharynx being implicated secondarily. Epidemics of acute pharyngitis have been described, but no definite cause for these outbreaks has been discovered, although they would seem to point to microbial origin, especially when their frequent association with acute tonsilitis and rheumatism is borne in mind. Infectious pharyngitis is the name applied to cases in which the disease is communicable, and runs a rapid course, resembling in this respect erysipelas of the pharynx, of which it may indeed be a variety.

Finally there are cases due to traumatism such as injury by foreign bodies, or the scalding of hot fluids, and those classified by Watson Williams as *toxic*, "dependent on gouty or rheumatic conditions, or the action of various drugs, *e.g.*, antimony, mercury, iodide of potash, and the symptomatic pharyngitis of various exanthemata such as measles, small-pox, scarlatina, typhoid and typhus fever." To these we would add the acute pharyngitis seen as an early syphilitic manifestation.

Morbid Anatomy and Pathology.—There are, at first, hyperæmia and swelling of the mucous membrane, with arrest of secretion, and then a viscid, mucopurulent fluid is poured out. In the event of a fibrinous exudation being met with, the case should be regarded as almost certainly of diphtheritic origin.

Symptoms.—These are general and local. The general symptoms are those which usually usher in an

acute inflammatory affection, viz., a feeling of chilliness, or even rigors, followed by rise of temperature, headache, pains in the limbs, and a sense of malaise. Loss of appetite, furred tongue, constipation, and scanty, high-coloured urine occur. Locally, the patient usually complains of some stiffness and discomfort in moving the neck. There is a frequent desire to swallow, which at first, may be only difficult, but soon becomes painful. If the uvula be markedly enlarged, there will be the sensation of a foreign body in the throat, and probably a hacking cough. This occurs especially on lying down, when the uvula comes in contact with the back of the tongue, or even the epiglottis. If the inflammation extends upwards into the naso-pharynx and nares, or has spread downwards from these regions, the voice will have a nasal twang; and if there be much interference with respiration through the nose, the mouth-breathing which is the result will aggravate the pharyngeal symptoms. Implication of the Eustachian tubes may give rise to deafness, earache, or even otitis media. Extension downwards into the larynx will cause hoarseness and increase the tendency to cough.

On inspection, the soft palate, uvula, tonsils, and pharynx will be seen to be swollen, and viscid mucus is adherent in places. In cases of unusual severity, the mucous membrane becomes of a dusky purple colour. The uvula is generally affected early, and may attain the size of a thumb from oedema.

Diagnosis.—The difficulty which arises, on first seeing the case, is the question as to whether the condition is due to one of the specific fevers or is merely a simple catarrhal pharyngitis. To settle this doubt, time is usually necessary, but in all cases of acute pharyn-

gitis, especially in children with constitutional symptoms, the chest and limbs should be examined lest the rash of scarlatina or measles be overlooked. In adults gout and rheumatism will account for some cases.

Prognosis.—Simple catarrhal pharyngitis is usually an affair of a few days to a week. It is only when the disease assumes an erysipelatous or septic type that danger need be feared.

Treatment.—At the commencement of an attack of acute pharyngitis, three grains of calomel, followed by a saline aperient, are generally useful. The patient should be confined to bed, or to a room kept at a temperature of 64° Fahr., and if the air be dry, and east winds prevalent, a bronchitis kettle, or vaporiser containing the compound tincture of benzoin, will be found beneficial, especially if there be an accompanying laryngitis or tracheitis. The diet should be light and unstimulating, and not taken too hot. A free supply of fluids, such as soda-water and milk, barley-water, home-made lemonade, is desirable.

Medicinally, drugs which act on the skin are indicated; *e.g.*, formula No. 13. If the temperature be high, the tincture of aconite in 2-minim doses every half-hour for three or four doses, and then at less frequent intervals, will have a good effect. Phenazonum (antipyrin) or phenacetin given in 5-grain doses every two hours, for two or three doses, has frequently a most satisfactory effect in reducing the temperature and relieving pain, and for patients who are not under constant observation, it is much to be preferred to aconite.

Guaiacum answers admirably with some rheumatic patients; it may be given in 5-grain doses, mixed with black-currant jam, every two or three hours, or the

trochisci guaiaci of the Throat Hospital Pharmacopœia may be ordered. If the patient be debilitated, carbonate of ammonium in an effervescing mixture (formula No. 30) will have a stimulating effect. The addition to this mixture of 10 or 15 grains of the salicylate of sodium will be found useful if the case be of rheumatic origin. The linctus morphinæ (formula No. 16), or glycerine lozenges, can be ordered if troublesome cough be present. In the stage of convalescence, iron, quinine, and other tonics, are indicated.

Locally, ice, both externally (in the form of ice compresses) and internally (as ice pellets) is to be preferred to warmth. Spraying the throat with a 10 per cent. solution of cocaine, will facilitate deglutition if this be very painful. In the acute stage, gargles are useless, and only increase the patient's discomfort. A 10 to 20 per cent. solution of menthol in liquid paraffin used as a spray has an excellent effect. When the uvula is very œdematous relief is afforded by puncturing it in three or four spots with a sharp pointed bistoury, and then gargling with some hot boracic or other simple solution.

3. CHRONIC PHARYNGITIS.

Chronic Pharyngeal Catarrh.

This is a chronic inflammation of the pharynx and adjacent parts. Three forms may be recognised. 1. Simple chronic pharyngitis. 2. Chronic granular pharyngitis. 3. Atrophic pharyngitis or pharyngitis sicca.

Ætiology.—It may be the sequel of successive acute attacks; more usually, however, it comes on gradually in persons of lax fibre, who lead sedentary lives in an unhealthy atmosphere. Bosworth, however, maintains

that "chronic pharyngitis is in no instance the result of repeated attacks of acute inflammation of this region, but, on the contrary, the chronic process sets in first, whereupon its clinical history is marked by repeated attacks of acute catarrhal sore throat." Excesses in eating, drinking, and smoking increase the predisposition to this disease, especially if they be combined with exposure to vicissitudes of the weather; hence, adult males are more frequently attacked than women and children. The strumous, gouty, rheumatic, and syphilitic diatheses predispose to the disease, while it is very commonly met with in anæmic females and dyspeptic or constipated individuals. W. Williams regards many cases as toxic in origin, and due to failure on the part of the liver to eliminate certain products of imperfect digestion, which have a specific effect on the pharynx in the same way that muscarin and belladonna have. The intimate connection existing between nasal affections and chronic pharyngitis should lead to a careful examination of the nose in all cases of chronic pharyngitis. Obstruction to nasal respiration, by causing the breathing to be carried on through the mouth, is a fertile cause of chronic pharyngitis, the explanation being, that the air, not being moistened, warmed, and filtered of foreign particles, by passing through the nares, dries up and irritates the pharynx. A dusty or insanitary atmosphere would render such predisposing causes more powerful. The nasal trouble may also cause pharyngeal disease by direct extension of the mischief, or by the action of the abnormal nasal secretion upon the pharyngeal mucous membrane, or, lastly, by the constant hawking and coughing caused by the effort to remove this secretion. A dry glistening condition of the pharynx, to which the term *pharyngitis sicca* has been

applied, is very often found in association with atrophic rhinitis, foetid and non-foetid, and also with the chronic dry rhinitis of anæmic women. Furthermore, it may be artificially, but unintentionally produced by a too free removal of intra-nasal structures in the operation of complete turbinectomy. Pharyngitis sicca has also been noted in diabetes mellitus, and a similar condition has been attributed to excessive tea drinking in badly nourished females. In some cases the pharyngeal affection is apparently preceded and kept up by gastric catarrh.

Morbid Anatomy and Pathology.—Under chronic pharyngitis, three different pathological conditions are included, viz., the simple chronic pharyngitis, the hypertrophic or granular, and the atrophic forms. In the first there is a chronic hyperæmia of the mucous membrane of the pharynx; this leads to proliferation of the cells of the connective tissue, and formation of fibrous tissue. The blood-vessels of the part dilate and become tortuous. The mucous glands may be enlarged at first, but after a time atrophic changes take place in the glandular structures as a result of the pressure of the newly formed fibrous tissue. In the second form (granular pharyngitis) there is usually an increase in the lymphatic structures, and the growth of adenoid tissue leads to the formation of small nodules upon the surface of the mucous membrane. In consequence of the changes that take place in the glandular structures, the secretion is markedly altered, so that the mucus becomes scanty and viscid.

The third, or the atrophic, form may be considered a further stage of the hypertrophic, though some authorities look upon it as a dry catarrh from the commencement. In it there is marked atrophy of all the

glandular structures, the mucous coat being reduced to a thin fibrous membrane, firmly fixed to the subjacent parts: according to Moure, the atrophic changes even affect the underlying muscular tissue.

Symptoms.—The symptoms of chronic pharyngitis are those enumerated under the head of local symptoms of acute pharyngitis, but they are less severe. One of the most troublesome is the hawking and clearing of the throat necessitated by the presence of viscid mucus at the back of the pharynx; this may give rise to retching, especially in the morning. The irritable condition of the pharyngeal mucous membrane may be the cause of a troublesome cough. The expectoration is sometimes streaked with blood, generally the result of much straining; that hæmorrhage from the pharynx, except as just mentioned, is anything but an extremely rare symptom, was the unanimous opinion of those who took part in the discussion at the Glasgow Meeting of the British Medical Association, on hæmorrhage from the pharynx and larynx. Patients often complain of the throat feeling “weak” and “relaxed,” while prolonged or excessive use of the voice induces “aching” and “stiffness” in the throat, or actual loss of voice. Professional voice users are very apt to suffer in this way. Of late, attention has been directed to the connection between pain in the occipital region and pharyngeal affections. The pain affects the nape of the neck, the lower part of the occiput, and sometimes the temple and the mastoid process—in a word, the domain of the great occipital nerve. In some cases, the symptoms are so severe, and there is so much interference with the general health, that inflammation of the mastoid cells may be suspected. The term “Legal’s disease” has been applied to that form of temporo-occipital head-

ache, having a pharyngeal and tympanic origin, and which can be relieved by inflating the Eustachian tube, and cured by treatment directed to the pharynx and ear.

In atrophic pharyngitis the chief complaint is of dryness of the throat and the difficulty of dislodging the viscid mucus, which collects on the posterior wall.

Pharyngitis, with extension to the Eustachian tube, may very closely simulate Menière's disease.

On examining the throat of a patient suffering from chronic hypertrophic pharyngitis, the tonsils, soft palate, uvula, and fauces will be found swollen, and the posterior wall of the pharynx has a velvety appearance. The mucous membrane is of a deeper red colour than usual, and is dotted here and there with enlarged follicles. A secretion of viscid mucus is always present in greater or less amount. Owing to the swollen condition of the parts, it is often impossible to get a view of the naso-pharynx. In the atrophic form, or pharyngitis sicca, as it is called, the mucous membrane is pale, dry, and glistening, or black in colour from the sticky, discoloured mucus adhering to it. Rhinoscopic examination in these cases is usually easy, on account of the wasting of tissues making more room in the naso-pharynx.

Complication.—The most important complications in connection with chronic pharyngitis are due to the extension of the inflammatory mischief up the Eustachian tube, causing deafness, and to the larynx setting up some form of chronic laryngitis.

Diagnosis.—The appearance of the throat, and the symptoms, are so characteristic, that the diagnosis is easily made.

Prognosis.—Chronic pharyngitis is a very trouble-

some and obstinate affection, at the same time certain forms of it may be greatly relieved by treatment.

Treatment.—The essential points in the treatment of chronic pharyngeal catarrh are to combat, as far as possible, the constitutional causes which underlie it, and to treat any well marked nasal trouble which may exist. A tepid or cold sponge-bath, with vigorous friction of the skin, wearing flannel next the skin, exercise in the open air, great moderation in the use of stimulants, leaving off smoking, avoidance of pepper, mustard, curry, and other pungent articles of diet, will be of service. A gorged state of the pharynx is often found associated with affections of the liver, with or without piles; in these cases, saline aperients (formulæ Nos. 20 and 29) will be found to act beneficially. If there be any affection of the nose, this must be treated as is directed under the head of Rhinitis. Especial attention must be directed to the pharyngeal tonsil, as an inflammatory condition of this organ is frequently accompanied by chronic pharyngitis. Certain mineral waters, notably those of Ems and Mont Dore, have a marked effect in some cases of chronic pharyngeal catarrh, so that patients who are in a position to undergo the treatment should certainly be advised to try it. We have often found that gargling the throat every morning with hot water, followed immediately by cold salt water (ʒss. to ʒv.) is an excellent local remedy in relaxed conditions of the pharyngeal mucous membrane.

As regards local treatment, the first thing to be done is to cleanse the mucous membrane from the viscid secretion adhering to it. For this purpose, the simple alkaline spray (No. 50) used in the nose, naso-pharynx, and pharynx will be found extremely useful. It should be employed, at least, night and morning. Should a more

stimulating application be desirable, spray No. 52 may be substituted, or listerine may be added to the alkaline spray. When the mucous membrane is in a healthier state, astringent sprays may be tried, such as Nos. 61, 62, or 63. The glycerine of tannin is sometimes useful as a local application, and much benefit often results from the employment, at night, of formula No. 45. This should be painted on with a large camel-hair brush. If the secretion be profuse, the trochisci cubebæ (Throat Hospital Pharmacopœia) will be found useful. A solution of menthol and eucalyptol (No. 66) in the form of a spray to the nose and throat, night and morning, will be found to have an excellent effect in some cases of pharyngeal catarrh.

In the atrophic form, alkaline sprays are indicated. The systematic use of the chloride of ammonium inhaler will be found of some use, as also the chloride of ammonium tabloids. Unfortunately, the disease represents a condition of failure of secretion, due to loss of the glandular tissue of the part, and it is not possible to repair this damage, though the application of the constant current is said to give good results. The medicated throat pastilles will be found a convenient mode of applying local remedies. Among the most valuable may be mentioned those of chlorate of potassium and borax, rhatany, and chloride of ammonium. If there be much irritation, the compound rhatany pastilles, which contain $\frac{1}{10}$ grain of hydrochlorate of cocaine, or $\frac{1}{4}$ grain codeia pastilles may be ordered; they are especially useful in the irritating cough of granular pharyngitis, and that caused by an elongated uvula. For the same purpose an excellent pastille is that containing bromide of ammonium and cannabis indica. Gargles are of little use, sprays being much more efficacious.

4. GRANULAR PHARYNGITIS.

(Clergyman's Sore Throat.)

This is a chronic form of pharyngitis, characterised by the presence of granular bodies on the mucous membrane of the pharynx.

Ætiology.—The causes which have been mentioned as producing chronic pharyngitis are also concerned in the production of granular pharyngitis, and notably, obstruction to nasal respiration; but the most powerful of all causes is, undoubtedly, over use of the voice, especially under unfavourable circumstances, as, for instance, when the individual is suffering from catarrh, in the open air, or in an atmosphere rendered impure by chemical vapours, dust, smoking, &c. Pungent foods and drinks have also an injurious effect. Women are more affected than men, possibly because anæmia, constipation and dyspepsia occur more frequently in them as a result of their mode of life. At the menopause, it is often a very troublesome affection, the symptoms, however, disappearing when the patient has passed the change of life. Neurotic and anæmic persons, and those debilitated from any cause, are particularly liable to suffer.

Morbid Anatomy and Pathology.—Granular pharyngitis may be a part of a general tendency to lymphoid hypertrophy, and may accompany enlargement of the faucial and pharyngeal tonsils. Bosworth believes that the disease commences during childhood, but that it does not attract the patient's attention until adult life. The granules are due to a circumscribed proliferation of lymphatic tissue around the efferent

ducts of the mucous glands ; the pavement epithelium of the mucous membrane extends over the granule, though it is thinned, and may be absent over the top of it. In some instances, the inflammatory process is more or less limited to the lateral walls of the pharynx. To this condition, the term *pharyngitis lateralis hypertrophica* has been applied. In such cases a well marked band of swollen, red and granular mucous membrane is seen behind the posterior faucial pillar, extending for its whole length and terminating below in the lateral wall of the pharynx. It is particularly well marked when the patient retches.

Symptoms.—The amount of discomfort the patient suffers is out of all proportion to the objective condition. A feeling of irritation is complained of, as though a foreign body were in the throat ; there is also a cough, but usually without expectoration. The cough is, at times, of a particularly irritating character, and may resemble the bark of a dog. Some of the cases described by Sir Andrew Clark, under the term of the “barking cough of puberty,” are caused by the irritation of a granular pharyngitis. Tickling, a sense of constriction or choking, a feeling of heat or dryness, darting, pricking sensations, and other paræsthesiæ, are frequently complained of. These are all apt to be exaggerated if stimulating articles of diet or drink are indulged in. The voice is not at first affected, but sooner or later the individual finds that he must clear the throat before beginning to speak ; in course of time he finds that he cannot talk for long without clearing the throat, and eventually the voice becomes much impaired, in consequence of the strain thrown on the larynx by the constant hawking. In lateral pharyngitis, the voice may have a nasal twang, and there is

often considerable pain in swallowing, owing to the lateral folds being compressed during deglutition. The mental effect must also be borne in mind, as patients are apt to imagine that they have some grave disorder of the throat, such as cancer or consumption, and are consequently subject to great depression. The objective symptoms of granular pharyngitis consist in the presence of roundish or oval prominences on the mucous membrane of the pharynx. They are of red colour, and usually rather darker than the neighbouring mucous membrane; they vary in size from a pin's head to a pea, but by coalescence larger masses may be formed. The vessels of the pharynx are enlarged, and a stellate arrangement is not uncommon.

Diagnosis.—The discovery of the granules on the back of the pharynx, together with the arrangement of the vessels above described, is characteristic of the disease.

Prognosis.—Granular pharyngitis is apt to be very annoying and very chronic. Recent improvements in treatment have, however, done much to remove the disease from the category of those which are incurable.

Treatment.—Before commencing the local treatment of granular pharyngitis, it is most important that attention should be paid to the general health of the patient. If there be any symptoms of indigestion, these should be seen to. If the patient be debilitated, tonics and a change of air should be advised. The spas of Bagnères-de-Luchon, Barèges, Cauterets, Mont Dore, and Ems, will often benefit the patient, especially in cases of lateral pharyngitis. If the nervous system be in an excitable condition, the combination of tonics and sedatives should be tried (*e.g.*, formula No. 24). Small doses of iodide of potassium, or the syrup of

the iodide of iron, are sometimes beneficial. Other possible causes of throat irritation must be excluded, such as nasal stenosis, enlargement of the adenoid tissue at the root of the tongue, &c. Lessons in voice production should hold an important place in the training of professional voice users, whose career is frequently blighted by a breakdown in the very apparatus upon which their livelihood depends—this is especially the case with female board school teachers. It is only when general treatment has failed, and other causes have been excluded, that local treatment should come into play. For this purpose, the galvano-cautery is by far the best form of caustic. Each granule must be touched with the galvano-caustic point or blade at a dull red heat; three or four applications can be made at a sitting. Any prominent vessels may be divided by applying the blade at right angles to them. If the throat be unusually irritable, it may be sprayed with a 10 per cent. solution of cocaine, but as a rule so little pain is experienced that this is unnecessary. The feeling of sore throat which follows is best relieved by effervescing lozenges containing chlorate of potassium and cocaine, or by the compound rhatany pastilles already mentioned. Only in very exceptional cases does the amount of inflammatory reaction require the use of ice pills.

The sittings should be at intervals of a week or ten days, and usually four or five suffice for the cauterisation of all the granules. If this be thoroughly carried out, the result is most satisfactory, and there is but little tendency to a relapse. If the granules are very large, it has been suggested that they should be split with a bistoury, and a concentrated solution of carbolic acid in glycerine applied to the cut surface; however,

the galvano-cautery answers excellently, even in advanced cases.

Surgeons who do not possess a galvano-cautery will find that chromic acid answers fairly well. The acid should be fused on to the roughened end of a probe and the bead thus formed should be of a reddish-brown colour. The granules are to be touched with the bead, and any excess of the acid is to be neutralised by gargling with a solution of bicarbonate of sodium, twenty grains to the ounce. A bead of nitrate of silver can be used in the same way.

The treatment of lateral pharyngitis is longer, more painful, and less successful, than that of granular pharyngitis. Schech says that in cases where time has been an object, and the bands very hard and thick, he has often excised them with a knife. The plan of treatment which offers the best prospect of cure is to destroy the exuberant growth by the free use of the galvano-cautery. The chief difficulty in the matter is that the lateral bands are so obscured by the posterior pillars of the fauces, that they are often only freely visible during phonation or retching, and it requires the greatest skill to avoid burning normal structures.

5. DILATATION OF THE PHARYNX.

Dilatation of the pharynx may be either general or sacculated; to the latter variety the term *pharyngocoele* is applied.

Ætiology.—This condition may occasionally be congenital. Usually, however, it is acquired; and it is then brought about by the giving way of the wall of the

pharynx. The sacculated variety is the more common form. Nothing is definitely known as to its cause.

Symptoms.—When the patient swallows, all the food does not pass into the œsophagus, but some collects in the pouch and forms an external swelling, by pressing over which he can force the food back into the mouth.

Treatment.—As a palliative measure, the patient may wear some kind of apparatus in the form of a collar, so as to exercise pressure upon the pouch during deglutition. The radical cure consists in excising the pouch and sewing the edges together, as has been so successfully practised for œsophageal diverticula by Butlin.

6. PERFORATIONS.

Perforations are sometimes seen in the anterior pillars of the fauces. Fowler's statement that these perforations are generally not congenital, nor due to syphilis, but that they are the result of suppurative disease of the tonsils, usually occurring in the course of scarlet fever, is in accord with our experience. Some of these perforations are, however, doubtless due, as Cohen has pointed out, to "a separate mucous investment of the palato-glossus muscle in the anterior fold of the palate."

7. PULSATING ARTERIES.

Pulsating arteries in the posterior wall of the pharynx are not uncommon. The abnormal vessel has usually been regarded as the ascending pharyngeal, but accord-

ing to Kelly some, if not all of the cases of *large* pulsating vessels in the pharynx are due to a tortuous condition of the internal carotids. Under such circumstances the removal of enlarged tonsils or post-nasal growths should be approached with caution. I (H. T.) have experienced one case of severe hæmorrhage from tonsillotomy from this cause, the vessel being apparently an enlarged ascending pharyngeal artery. It was bilateral. Aneurysms are rarely seen in comparison with pulsating arteries.

Not infrequently there is a want of symmetry in the posterior wall of the pharynx, one side may project more than the other. It is important to remember that this may be a congenital condition, otherwise a tumour might be suspected. It has also been pointed out that the lower pharynx may be narrowed by an angular curvature of the cervical portion of the spinal column. Exostoses and prominences of the cervical vertebræ projecting into the pharynx have occasionally caused difficulty, not only in swallowing, but when they occur in the naso-pharynx they considerably hamper the surgeon in operating upon that region.

8. RETRO-PHARYNGEAL ABSCESS.

Inflammation terminating in suppuration in the connective tissue between the spinal column and the pharynx.

Ætiology.—This is especially a disease of infancy and childhood. Cases of retro-pharyngeal abscess occurring in children two or three months old have been recorded. Seventy-five per cent. of the cases of the so-called *idiopathic* retro-pharyngeal abscess occurs

in children under one year of age, and according to Sokoloff, it never attacks those above four. Bosworth has, however, drawn attention to the fact that retro-pharyngeal abscess may occur in adult life. He has himself seen a case as late as the age of thirty-seven. I (H. T.) have seen two cases secondary to extensive subdural and tympanic suppuration in adults in which the pus seemed to pass down under the mucous membrane of the Eustachian tube to the pharynx. The occurrence of a retro-pharyngeal abscess after the period of childhood is, nevertheless, a rare event. The disease may occur idiopathically, or be secondary to disease of the spine, or be due to traumatism. According to Bókai, out of 144 cases, 129 were idiopathic. Rickets and general malnutrition favour the onset of the malady. Any inflammatory condition of the mucous membrane of the pharynx and adjacent cavities, especially if septic, may form the starting point of the disease. The secondary variety usually occurs as the result of caries of the spine in tuberculous, rachitic, or syphilitic patients. Sometimes it may be due to traumatism, such as a fall on the back, and a case is reported in which the abscess came on in a young man as a result of injury to the posterior pharyngeal wall, from swallowing a hard substance. It may also occur as the result of septicæmia.

Morbid Anatomy and Pathology.—It has been shown that there are two lymphatic glands, situated in the retro-pharyngeal tissue at the level of the second and third cervical vertebræ, and it is to the extension of inflammation from the mucous membrane to these glands, that the existence of retro-pharyngeal abscess is due. As these glands begin to dwindle away about the third year of life, and have disappeared by the fifth

year, the idiopathic disease is practically confined to this period of childhood. Hence, also, retro-pharyngeal abscesses are not often of tuberculous origin, because at the age at which tuberculous affections have become common, these glands have already disappeared. In the adult, retro-pharyngeal abscess is due to the same causes as give rise to the formation of an abscess in any other part of the body.

Symptoms.—In idiopathic cases the symptoms usually come on rapidly, and dysphagia is the first to be noticed; in some cases there may be acute pain, rapid pulse, fever, and constitutional symptoms; in others, the disease may be more insidious in its onset. As the abscess enlarges, difficulty in breathing occurs, the respiration becomes stridulous, and there is usually a croupy cough. If the child be old enough to speak, the tone of the voice will be found altered, and it may have a nasal twang. The glands in the neck are usually enlarged.

Wheelock has drawn attention to the “hen-cluck” stertor as pathognomonic of retro-pharyngeal abscess with pressure on the larynx. When secondary to disease of the cervical vertebræ, the affection is preceded by stiffness of the neck and deformity of the spine, the symptoms come on more gradually, and there may be an entire absence of fever. On examination, a projection of the posterior wall of the pharynx may be seen, and on palpation this may be felt to be elastic and fluctuating. Externally, a swelling may be seen and felt at the angle of the lower jaw. If it can be used, the laryngoscope is the best means of ascertaining the size and situation of the abscess.

Diagnosis.—This is often difficult, because at the age at which the disease commonly occurs a pharyngeal

examination is not very easily carried out. In a doubtful case a digital examination will generally afford the most reliable information. The dysphagia, dyspnœa, and croupy cough may give rise to the suspicion of diphtheria, but an examination of the fauces should suffice to clear up this difficulty.

In a child, the bulging of the posterior wall of the pharynx should suggest the existence of an abscess; in an adult, a gumma should be first thought of. A softening gumma sometimes so closely resembles a retro-pharyngeal abscess, that it is desirable, in doubtful cases, to try the effect of full doses of iodide of potassium before incising the swelling.

Prognosis.—This must in all cases be guarded. Unless the case be treated promptly, death may occur from complete closure of the glottis by pressure, or from the occurrence of œdema; or the abscess may burst during sleep and the contents enter the larynx, and suffocate the patient. Even when the abscess is opened surgically there is some risk of the pus passing into the larynx. Moreover, all danger is not over after the abscess has been evacuated, as some pus may find its way into the air passages, and set up broncho-pneumonia or abscesses in the lungs, or the abscess cavity may become septic and prolong the course of the disease. Turner records a case in which death was caused by pressure on the trachea although tracheotomy had been performed.

Where the retro-pharyngeal abscess is secondary, the prognosis is very grave, on account of the nature of the disease with which it is associated.

Treatment.—This is essentially of a surgical nature. All surgeons are agreed as to the importance of opening the abscess as soon as possible, the only point in dis-

pute being as to whether the abscess should be opened internally or externally. Bókai says the results of opening the abscess through the mouth are very good; there were only three deaths in 106 cases. The operation is a slight one, is only exceptionally followed by the aspiration of pus into the air passages, and can be repeated without hesitation if the abscess refills. In opening the abscess through the mouth, a vertical incision should be made, and the head of the child held forwards to favour the escape of the pus from the throat. To avoid asphyxia or swallowing of pus, Dupré's method of first inserting a trochar to remove the greater part of the purulent collection, and then enlarging the incision with a bistoury may be employed, instead of a simple incision.

On the other hand the operation from without is often very difficult; but if the abscess be due to spondylitis, this method is to be preferred, because it avoids contaminating the abscess cavity with septic matter from the mouth. Contrary to the opinion of most surgeons, Burckhardt advises the external opening of a retro-pharyngeal abscess, whether it be of idiopathic or septic origin, or due to spondylitis. Pollard advises that the abscess, more especially in tuberculous cases, be opened in the neck at the posterior border of the sterno-mastoid, and a drainage tube introduced well into the cavity. The incision should be at least an inch in length, commencing the same distance below the mastoid process. The carotid vessels and the vagus must be pushed forwards without injuring the sheath of fascia in which they are enclosed.

If the dyspnœa be very urgent, tracheotomy may be necessary.

After local surgical treatment has been carried out

the patient will require careful supervision. If there be symptoms of a strumous or tuberculous diathesis, the syrup of the iodide of iron and cod-liver oil will be found useful, and convalescence will be accelerated by change of air. If there be any tendency to laryngeal spasm, bromide of potassium should be given.

9. NON-MALIGNANT GROWTHS OF THE PHARYNX.

All kinds of new growths have been recorded as occurring in the pharynx. Attention has, of late, been especially directed to the so-called dermoid tumours of this region; these consist of a fatty mass with a fibrous stroma, sometimes containing cartilage and striated muscular fibre, and covered with skin and fine hair. They are met with in infants at birth or in the early years of life, and they are considered by Arnold to be teratomata of heterogenic or autogenic origin. Higbet exhibited a remarkable specimen of tumour of the pharynx. It was described as a large mucous polypus, three inches long by an inch and three quarters wide, and consisted of loose connective tissue covered with mucous membrane; it resembled the tongue very closely. Papillomata are fairly common, and grow from all parts of the mucous membrane, probably most often from near the base of the uvula or the anterior pillar of the fauces in the region of the supra-tonsillar fossa. Adenomata come next in frequency, and are usually sessile, firm, and covered with a normal mucous membrane; they are found mostly in the soft palate. Fibromata are also occasionally seen, and may attain considerable dimensions.

Wolfenden has described an interesting case, in which the whole of the right side of the posterior wall of the pharynx, in the pharyngo-oral region, was occupied by a large angioma. "It was knotty, dense, and of a purple colour."

The subject of tumours of the palate has been exhaustively and ably treated by Stephen Paget. He points out that "in the small space of the palate almost every kind and sort of tumour have been observed: cysts, nævi, papillary growths; tumours of bone and of cartilage; glandular, sarcomatous, and cancerous growths."

Symptoms.—The most important symptom is dyspnœa; this varies according to the situation and size of the tumour. In Highet's case the tumour grew from the left great cornu of the hyoid bone, and caused the sudden death of the patient. Dysphagia is also a frequent symptom if the tumour be of large size. Cough, and the sensation of a foreign body or tickling in the throat, are constant symptoms.

Prognosis.—The benign tumours of the pharynx are usually readily removed, and consequently, if they are recognised early and properly treated, the risk to life is small. Paget points out that "rapid growth, infiltration, extension outward and downward, advanced age in the patient, enlarged lymphatic glands, glossy smoothness and adhesion of the mucous membrane over the tumour—all these are bad signs," inasmuch as they indicate that the disease is of a malignant nature.

Treatment.—The smaller tumours, especially if they are pedunculated, may readily be removed by means of the cold wire or galvano-caustic loop, the parts having been previously rendered anæsthetic by

the application of a 20 per cent. solution of cocaine. A sessile papilloma should always be freely removed especially if there is any thickening or induration of its base. The adenomata of the soft palate may usually be shelled out. Paget recommends that cocaine should be injected under the mucous membrane covering the tumour, and not only applied over the surface. In the light of recent experience, eucaine β would probably be a safer and equally efficient local infiltration anæsthetic. The mucous membrane should then be incised, care being taken not to wound the growth; the tumour is now to be enucleated, and hæmorrhage should be arrested by steady pressure.

10. MALIGNANT GROWTHS OF THE PHARYNX.

The pharynx is attacked by both carcinoma and sarcoma; epithelioma (squamous-celled carcinoma) is the form of malignant disease most frequently met with in this region.

Morbid Anatomy and Pathology.—The morbid anatomy of growths occurring in the pharynx differs in no respect from growths of the same nature occurring in other parts of the body.

Pharyngeal carcinoma is met with most frequently in the lateral walls, or in the soft palate, more rarely behind the larynx at the upper border of the œsophagus, and is very seldom seen in the vault of the pharynx. Its early growth resembles a small ulcer on an indurated hyperæmic base, which quickly enlarges and infiltrates surrounding tissues. The neighbouring lymphatic glands are early enlarged. Sarcomata of all kinds are found

in this region, lymphosarcoma being the most common (Butlin). They are covered as a rule by a red, velvety mucous membrane, and often have the feel of fluctuation. Their rate of growth varies, and is usually more rapid when they penetrate beyond their investing capsule to infiltrate neighbouring structures. Ulceration is not so early or so deep as in epitheliomata of this region.

Symptoms.—In sarcoma of the pharynx, the chief symptom is dysphagia. Pain is not a very marked feature. Dyspnœa only occurs when the growth is sufficiently large to obstruct the glottis.

In cancer, on the other hand, a very constant symptom is pain on swallowing, extending up to one or both ears, and in advanced cases the patient may be quite unable to swallow. He complains of a feeling of soreness in the pharynx, or the sensation of a foreign body in the throat, and is constantly hawking and making efforts to clear the throat of the blood-stained mucus, which is so commonly secreted in these cases.

The inability to take food, pain, want of sleep, offensive discharge, and salivation, all tend to induce cachexia in the patient. Should the folds of mucous membrane between the upper and lower jaw become infiltrated, fearful pain on chewing, swallowing, and talking will be complained of. If the growth obstructs the choanæ, there will of course be an interference with nasal respiration, on one or both sides as the case may be. In sarcoma of the pharynx there is much less tendency for the lymphatic glands to become affected, than when the tonsil is attacked. In carcinoma the glands are almost invariably enlarged, and occasionally the glandular swelling is the most marked feature of the disease.

Diagnosis.—The probable difficulties will lie between a diagnosis of carcinoma, sarcoma, or syphilis. In the former we should expect early ulceration upon an indurated, infiltrating, hyperæmic base, early enlargement of neighbouring lymphatic glands, with pain, as an early and prominent symptom, and rapid onset of cachexia.

In sarcoma, difficulty of swallowing is an early symptom, the growth is softer, non-ulcerated (in early stage), covered by a red, soft mucous membrane, the lymphatic glands are not, as a rule, early involved, but when the growth itself spreads there is often a general infiltration of the tissues of the neck, near the angles of the jaw. When the growth ulcerates the loss of tissue is more superficial, and pain and fœtor become marked symptoms.

In tertiary syphilis the resemblance to malignancy may be very great, because the former, like malignant disease, may be unilateral, and the ulceration deep, the discharge fœtid, and enlarged glands are sometimes present in the neck. In all three the ulcer may be covered with a greyish-white exudation of pus and broken down tissue, but in syphilis the ulcer has not such hard edges or a thickened infiltrating base as in carcinoma, while the pain and constitutional symptoms are very much less marked than in either form of malignant disease.

Finally, the administration of iodide of potassium in syphilis is fraught with very rapid and permanent improvement. Undoubtedly cases sometimes occur in which the drug has a good effect on cancer, but it is not lasting, and the general constitutional and local benefit in tertiary syphilis when under the influence of iodides, quickly eliminates the latter disease from the diagnosis.

The most certain evidence is the removal of a portion of the growth, and the discovery in it, on microscopical examination, of a cancerous structure.

Prognosis.—Owing to the localisation and encapsulation of the disease, and to non-implication of the lymphatic glands, sarcoma of the pharynx is not so grave a disease as sarcoma of the tonsil, inasmuch as it is possible, in some cases, to extirpate the growth completely. In carcinoma of the pharynx, on the other hand, unless the growth is freely removed in its early wart-like stage (and permanently successful cases have been reported), the prognosis is practically hopeless; death usually puts an end to the patient's sufferings within a year, three to six months being a very common period.

Treatment.—In cases of encapsulated sarcoma, it may be possible to enucleate the growth by the index finger through a linear or crossed incision. If the growth be pedunculated, it can be removed by the cold wire snare, or the galvano-caustic loop (Bosworth). In carcinoma of the pharynx, measures such as cauterisation, scraping, &c., are to be avoided, as they only irritate the part and cause a more rapid growth. The results of sub-hyoidean pharyngotomy in carcinoma of the posterior wall of the pharynx, as shown by a series of 28 cases, are unfavourable. Half of all the cases died under operation, the other half from relapses; only one case was definitely cured. If, as is usually the case, the disease is beyond the reach of radical surgical interference, all that can be done is to keep the patient's mouth as clean as possible with antiseptic gargles and sprays (formulæ Nos. 1, 2, 7), to relieve the dysphagia by spraying or painting the pharynx with a 20 per cent. solution of cocaine five minutes before food is taken, or,

in extreme cases, feeding the patient *per rectum*. The pain must be met by the free administration of morphia, preferably subcutaneously.

11. TUBERCULOSIS OF THE PHARYNX AND TONSILS.

Though, in comparison with the frequency of tuberculosis in some other parts of the body, the number of cases of tuberculosis of the pharynx is small, still it occurs more frequently than was formerly supposed, and the careful examination to which the throat has been subjected of late years has led to numerous examples of the disease being put on record.

Ætiology.—Tuberculosis of the pharynx may be either primary or secondary. At one time the existence of a primary tuberculosis of the pharynx, as of the larynx, was denied, but the labours of B. Fraenkel and Isambert have settled the question in the affirmative. As a matter of course, however, the vast majority of the cases are acute and secondary to pulmonary tuberculosis. What determines the implication of the pharynx yet remains to be decided. In the cases hitherto recorded there has been nothing discovered to explain why the part has been attacked, and the accounts given by the patients themselves did not appear to indicate any especial tendency to pharyngeal affections, previous to the onset of the tuberculous disease.

Cases of tuberculosis of the pharynx have been met with at all ages. It occurs most frequently, however, in men between the ages of 20 and 30.

Morbid Anatomy and Pathology.—Two forms of tuberculous affection of the pharynx are to be distin-

guished. In the one we have to do with a deposit of miliary tubercle, which appears as greyish-yellow nodules on the soft palate and pillars of the fauces; in the other the disease is more advanced, and has gone on to ulceration.

The progress of the miliary tubercle towards ulceration can sometimes be exactly followed. The ulcers at first are lenticular, having a greyish appearance, with a scanty muco-purulent secretion. Very soon the ulcers coalesce and form irregular patches. The ulceration spreads laterally, and has no tendency to destroy the deeper structures, since it is usually superficial. The disease is localised most frequently to the arches of the palate, then to the uvula, the posterior pharyngeal wall, and most rarely the naso-pharynx. But wherever the disease commences, sooner or later the uvula is affected, and in advanced cases it becomes much enlarged, sometimes attaining the size of a man's thumb. Though the ulceration may extend downwards, it ends abruptly at the œsophagus. It may also occur on the tonsils, producing ulcers similar to those found on the palate.

In some cases tissue formation is in excess of tissue destruction, and we get nodular excrescences and thickening of the mucous membrane; these are the chronic cases which it is so difficult to distinguish from lupus of the pharynx.

The lymphatic glands are often much enlarged; not only the cervical glands, but also the axillary, cubital, and inguinal glands, have been found affected.

Symptoms.—The characteristic symptom of tuberculosis of the pharynx is the pain in the throat, which frequently radiates up to the ears; this is due in some cases to the extension of the disease into the Eustachian

tubes. In addition to the more or less constant soreness in the throat, the attempt at swallowing usually brings on a severe paroxysm of pain, and in some cases the agony is so intense that patients choose rather to suffer the pangs of hunger than take food. Besides the pain there is also difficulty in swallowing, owing to the infiltration between the muscles. If the soft palate be affected, liquids may be forced back through the nose. As a natural result of the pain and difficulty in swallowing, there is rapid emaciation and loss of strength. Fever is almost invariably present, but not of a very characteristic type; the temperature usually varies between 98.4° to 100.4° F. in the morning, and 101° to 103° F. in the evening. The mucous membrane of the palate and pharynx generally is very pale, resembling in this respect the tuberculous larynx, but in the early stage the palate may be slightly hyperæmic. In some cases, but not in all, the breath is fœtid, and there is usually a considerable quantity of a viscid secretion and a troublesome cough, which is ineffectual in removing the mucous accumulation in the throat. The voice has almost always a nasal twang, owing to the swollen paretic condition of the palate.

Complications.—Tuberculosis of the pharynx may be complicated with tuberculosis of the tongue or lips. In some cases the disease commences in the pharynx and extends forwards, in other cases the converse occurs. In the majority of instances, as already mentioned, the pharyngeal affection exists as a complication of pulmonary tuberculosis.

Diagnosis.—Acute pharyngeal tuberculosis may be confounded with follicular tonsillitis, diphtheria, herpes of the pharynx, and syphilis. Follicular tonsillitis may be excluded by its acute onset and by the limitation of the disease to the tonsils.

In diphtheria there is a membrane, whereas in tuberculosis we have to do with superficial ulceration; but if seen late in the disease and in the absence of any definite history, the diagnosis between these two conditions may be far from easy. A bacteriological examination will, however, settle the question. An herpetic eruption may present considerable difficulty, but the vesicles usually heal in the course of a week or ten days. A microscopic examination of particles of the deposit will suffice to distinguish pharyngo-mycosis. The mucous patches of inherited or acquired syphilis can usually be recognised by the existence of other evidences of syphilis.

The only conditions with which chronic pharyngeal tuberculosis is liable to be confounded are syphilis and lupus of the pharynx.

From the former, the diagnosis is sometimes only to be cleared up by the discovery of the tubercle bacillus. It must be borne in mind that the presence of tuberculosis in other organs does not necessarily imply that the pharyngeal affection is tuberculous, nor, on the other hand, does the existence of syphilis in the past prove conclusively that the throat affection is of syphilitic origin. Again, the condition may have originally been of a syphilitic nature, but the tubercle bacillus having found a suitable soil has developed there afterwards.

Tuberculous ulceration may be distinguished from lupus by the fact that it does not heal spontaneously, whereas lupus may. The rapid growth of tuberculosis is in contrast to the much slower progress of lupus. In tuberculosis pain on coughing or swallowing is a marked symptom, in lupus it may be almost absent. Objectively tuberculosis and lupus have much in common; the latter, however, is more knobby, and the

edges of the ulceration are more thickened than is the case in tuberculosis, and in portions of the lupoid area cicatrisation is often seen and is characteristic. Moreover, lupus hardly ever occurs on the posterior pharyngeal wall or on the tonsils.

The pallor of the pharyngeal mucous membrane in tuberculosis is usually characteristic, the ulcers are shallow and the edges are ill-defined; in syphilis the ulcers are deeper and the margins are sharply defined.

Prognosis.—The outlook in tuberculosis of the pharynx is almost invariably unfavourable, and until recently no actually cured cases of pharyngeal tuberculosis had been reported.

The average duration of the cases is from two to six months from the commencement of the ulceration. Death takes place in the majority of cases in from six to twelve weeks. A patient of mine (F. de H. H.) died exactly six weeks from the commencement of the throat symptoms, death being accelerated by the inability to take food by the mouth.

It is possible in the more chronic cases, by means of energetic local treatment, to cause the ulcerated patches to cicatrise, but the relief is generally only temporary. Gleitsmann, Heryng and others have, however, reported cases in which active local treatment seems to have produced a permanent cure.

Treatment.—The constitutional treatment is the same as for tuberculosis of any other organ, so it will suffice here to describe only the local treatment. In the acute forms relief of pain is the chief goal to be aimed at, if only to spare the patient from dying of starvation. To this end we have an invaluable drug in orthoform. It is probably the best local anæsthetic

we possess, but it must be remembered that it is only of use in cases where the surface epithelium is broken—it is invaluable in the various forms of ulceration of the upper respiratory tract. Its action is prolonged, varying from two to twelve hours. It rarely shows any constitutional toxic effects, and has no after-effects. The drug can be liberally used and may be prescribed as a powder, pastille, spray or paint, the powder and spray being most valuable.

In the absence of this remedy, cocaine sprays or pastilles, ice pills, insufflation of boracic or mixtures of boracic and iodoform powders may be used. Sprays or applications of menthol dissolved in liquid paraffin, we have not found so beneficial as in other painful conditions of the throat. Often the yolk of an egg, or an oyster can be swallowed with less pain even than liquids. The insufflation of powder No. 47 at night will often have a good effect. During the day a moist warm inhalation, such as Formula 68, or dry inhalation from an oro-nasal inhaler of the vapour of benzoin, pine, terebene or menthol, will relieve the cough and sweeten the expectoration. When the patient becomes unable to swallow, attempts should be made to introduce food into the stomach through a soft tube passed through the nostril or the mouth; if this cannot be done, the patient must be fed by the rectum.

The lactic acid treatment has now taken the place of other methods of endeavouring to attain cicatrisation of the ulcerated patches in the more chronic cases. The first thing to be done is to render the part anæsthetic by means of the application of cocaine in a 20 per cent. solution. If there be much thickening, the surface of the ulcer may be scraped with a sharp spoon, and a 30 to 80 per cent. solution of lactic acid rubbed

in by means of cotton-wool on a suitable holder. In obstinate cases undiluted lactic acid has been employed. Care must be taken in making the first application or two, not to carry out the treatment too vigorously or over too large a surface, as patients differ much in the way they are affected by lactic acid. Notwithstanding the free use of cocaine the application is often very painful.

The case recorded by Gleitsmann is a remarkable instance of the success attending vigorous local treatment. By means of curetting with a sharp spoon, the energetic application of lactic acid, and at times the use of the galvano-cautery, a complete cure was obtained in spite of several severe relapses, during which the epiglottis became infiltrated. On the occasion of the last relapse, Gleitsmann scraped away all the diseased tissue most energetically, without regard to the subsequent hæmorrhage, and rubbed in undiluted lactic acid. The patient was examined and found perfectly well more than two years after the commencement of treatment. Good results have also been obtained by the application of guaiacol, or sulphuricinate of phenol, (Rualt) after curetting the ulcerated surface.

If the patient be unable to stand the lactic acid treatment, a 10 or 20 per cent. solution of menthol in olive oil or paroleine may be applied to the ulcerated surface. Heryng recommends that the uvula be removed should it be thickened and ulcerated. If the case be deemed unsuitable to attempt a radical cure, all that can be done locally is to keep the surface of the ulcer as clean as possible by means of antiseptic sprays and gargles.

In persons suffering from pulmonary tuberculosis or with a phthisical family history, any erosion of the

pharynx, or chronic pharyngeal catarrh, should be regarded with suspicion, and prompt steps taken to treat any threatened ulceration.

Tuberculosis of the Tonsils.

The tonsils may be affected as a part of tuberculous pharyngitis, but occasionally they are attacked when the rest of the pharynx is free. In these cases, evidences of tuberculosis will generally be found in the larynx or lungs. Hugh Walsham has, however, shown that tubercle may be primary in the tonsil, and secondarily infect other parts, such as the lungs, and more especially the cervical glands. Krueckmann also found tubercle bacilli in the tonsils of 60 per cent. of cases of tuberculosis, and says that tubercle of the cervical glands always arises from primary tonsillar infection.

Such observations have been confirmed by others (Ruge, Peter, Cornil), and we need do no more now than point out the enormous importance of thus recognising the tonsils, especially large unhealthy ones, as portals both of local and systemic infection. There is little doubt that scrofula, as evidenced by enlarged cervical glands, is less common to-day than in the sixties and seventies, when as Allbutt says "it was as common to see persons marked by scars of scrofula as it still was to see the marks of the ravages of small-pox," and we are in entire agreement with him in regarding this as largely due to the great attention which has of late years been paid to diseases of the upper air passages, particularly tonsils and post-nasal growths, and, we may add, the teeth. As to the manner in which the tonsils become infected by tubercle bacilli in children, Laser believes that in crawling about they

get their hands covered with dust and dirt, and then infect themselves by sucking their fingers. The sucking of toys and dusty "comforters" is another possible source of infection. Probably some bacilli gain access in tuberculous milk, or lodge on the surface of the tonsils during respiration, and in unhealthy conditions of the latter find suitable media for development.

Isolated tuberculous ulceration of the tonsils is, however, a very rare occurrence, but its existence requires to be borne in mind, otherwise the case might be regarded as syphilitic.

Strassmann has directed attention to the fact that tubercles may be found post mortem in tonsils which, to outward appearance, are normal. The bacilli find their way into the crypts, and there set up an ulcerative process, which is not visible on the surface of the tonsil; to detect this change, tonsils which are apparently healthy require to be examined carefully, sections being made through the tonsils for microscopic examination.

The treatment of tuberculosis of the tonsils is the same as that employed in cases of tuberculosis of the pharynx.

12. LUPUS OF THE PHARYNX AND LARYNX.

As the pharynx and larynx are commonly simultaneously affected with lupus, it will save repetition if the consideration of the affection of these organs be taken together.

Ætiology.—Lupus occurs at least twice as frequently in females as in males. It generally begins before puberty and is rare in very young children.

The scrofulous diathesis predisposes to it, and a family history of phthisis is often to be obtained, although other evidences of tubercle are not common in patients suffering from lupus. No conclusion can be drawn as to the effect of heredity. Local irritation of the throat by tobacco, alcohol, &c., does not seem to have any direct influence in producing the disease.

It is very uncommon to find lupus affecting the palate, pharynx or larynx in the absence of cutaneous manifestations, although a few rare cases have been recorded in which the primary lesion was situated in the throat. The frequency with which lupus of the external parts is accompanied with secondary deposit in the pharynx or larynx has been estimated at about twenty per cent.

Morbid Anatomy and Pathology.—In lupus affecting the pharynx and larynx there is an infiltration of the mucous membrane with small cells, amongst which “giant cells” containing peripherally disposed nuclei, and “plasma cells” are to be found; the disease belongs to the class of granuloma. Koch, Neisser, and many other eminent authorities look upon lupus and tuberculosis as essentially identical morbid conditions, both due to the presence of a specific micro-organism, the tubercle bacillus, yet differing in their clinical manifestations under different conditions. Kaposi, Hutchinson, and others do not share this view and argue that the very dissimilar clinical features of the diseases form a strong argument in favour of a separate micro-organism. It is certainly difficult to understand why in one case the tubercle bacillus should produce the rapidly destructive and extensive ulceration of tuberculous laryngitis, and in another the very chronic, painless, and practically local disease seen in

lupus. On the other hand, what significance is to be attached to the facts that injection of lupoid tissue has produced tuberculosis in guinea pigs (Koch) and that both diseases react to tuberculin injections? Marty and Lastra regard laryngeal lupus as a form of laryngeal tuberculosis characterised by a lack of the infectious element of the bacillus, *i.e.*, it is an attenuated tuberculosis. Lupus of mucous surfaces is more liable to be complicated with inflammation and ulceration than when it affects the skin. It may also lead to stenosis. The fauces are almost invariably affected before the larynx. The lymphatic glands are seldom, if ever, enlarged in lupus; consequently the view that the disease follows the lymphatics is erroneous.

In the pharynx, lupus, if observed at the onset, is seen to give rise to thickening and irregularity of the mucous membrane, which may have a granular appearance. The part attacked is usually of a deeper colour than the healthy mucous membrane. Then small nodules may develop and attain the size of a pea; sometimes they appear in apparently healthy mucous membrane. The nodules may be superficial or extend even to the sub-mucous tissue; they have the usual rosy-red, apple jelly colour of lupus nodules elsewhere. The affected part of the mucous membrane becomes stiff and loses its mobility, and after a time softening may occur, giving rise to ulceration, sometimes superficial, sometimes extending deeply. In cases where the soft palate is extensively diseased the uvula becomes infiltrated, much thickened and club-like. The ulceration is occasionally accompanied by extensive loss of substance, the uvula may be destroyed and a gap may even be left in the soft palate, in which case the perforation proceeds from the buccal and not the

naso-pharyngeal surface (c.f. syphilis). Ulceration usually runs a chronic course, but at times destruction of tissue takes place with startling rapidity. The healing of the ulceration is accompanied by the formation of radiating, firm cicatrices, and the recurrence of ulceration in these scars is pathognomonic of lupus. In cases of some duration the mucous membrane is as a rule pale, but the pallor is more marked in the larynx than in the pharynx. The epiglottis is usually irregularly enlarged; not infrequently there is considerable loss of substance and a mere stump may be left, or it becomes pale, stiff, and fibrous. The ventricular bands may become swollen, and nodules may form in them. The general appearance of the larynx is rough, thick, and granular, giving it a worm-eaten look, but as a general rule the vocal cords escape, at any rate till late in the disease, a striking contrast to the laryngeal lesions of syphilis and tubercle. If the ventricular bands and arytænoid regions become much infiltrated, or excessive ulceration occurs, such a degree of stenosis may be produced as to necessitate tracheotomy. The cartilages of the larynx are very rarely attacked by the disease.

Symptoms.—Lupus of the throat is not usually a painful affection; indeed, there is often anæsthesia of the surface, in exceptional cases hyperæsthesia has been noticed. Ramon de la Sota, however, states that there is no alteration in the sensibility of the mucous membrane in lupus, and he regards this as one of the diagnostic points between lupus and leprosy, the latter being generally accompanied by anæsthesia. In pharyngeal lupus the patient does not complain much of the throat, only feeling slight discomfort and stiffness in the fauces; later on, especially when destruction of the

soft palate has occurred, deglutition becomes difficult, and fluids return through the nose on attempts at swallowing. As lupus of the larynx causes very little trouble at first, it may be overlooked, unless a laryngoscopic examination be made. Usually, however, there is hoarseness, sometimes going on to complete aphonia, and when the soft parts become infiltrated or cicatricial contraction has occurred, dyspnœa may result. The epiglottis is the seat of predilection, and if it be destroyed the patient frequently experiences difficulty in deglutition, cough being excited by the entrance of food into the larynx.

The **diagnosis** of primary lupus of the pharynx or larynx is very difficult: some authorities even go so far as to say that one can never be sure of lupus of these organs, unless one finds lupus on the exterior of the body. It requires to be distinguished from epithelioma, syphilis, especially in its hereditary or earlier acquired manifestations, and tuberculosis affecting these parts. As regards the differentiation of epithelioma of the larynx from lupus, in the former the age of the patients is greater, the growth is harder, and has a more unequal surface, and it is at its commencement commonly unilateral. Moreover, lancinating pains are a frequent accompaniment of the later stages of cancer, whereas lupus is not usually a painful affection. Tertiary syphilitic ulcerations of the pharynx and larynx generally run a more rapid course than lupus; they are more sharply cut, deeper, and with a better marked hyperæmic areola than those met with in lupus and are usually speedily benefited by full doses of iodide of potassium. The extensive formation of cicatricial tissue, which is so characteristic of syphilis, is wanting in lupus. The presence or absence of necrosis

or caries of bone has been suggested as a crucial test between syphilis and lupus. Hutchinson for example, states that in lupus "the bones are never involved," and "no perforations of the palate occur." This statement, however, requires qualification, as there are cases of undoubted lupus on record in which necrosis of bone has occurred (J. M. Hunt). According to Lennox Browne tertiary syphilis usually attacks the palate from the nasal surface, whereas lupus does so from the buccal aspect. The tonsils, moreover, are not affected in lupus. The ulceration of the pharynx met with in inherited syphilis may be mistaken for lupus; the history of the case, and the presence of notched central incisors and other signs of syphilis, will usually enable the diagnosis to be made; but at times it will be almost impossible to be absolutely certain of the nature of the lesion. From tuberculosis of the pharynx or larynx, lupus is differentiated by its much slower course, its tendency to heal and cicatrise in one direction while it is advancing in another, by the absence of pain, dysphagia, wasting and fever, the patient being often in apparently good health.

Prognosis.—The cure of a pharyngeal lupus may be looked for in certain favourable cases; the same may be said, though to a much less degree, of the laryngeal affection. In both pharynx and larynx, lupus runs a slow course, and apart from the possible risk of stenosis of the larynx there is no immediate danger to life. As to whether pulmonary or general tuberculosis may result from lupus of the throat, there is not sufficient clinical evidence to answer this question either in the negative or affirmative.

Treatment.—The constitutional treatment of lupus is almost identical with that of tuberculosis, *i.e.*, fresh

air, country or seaside residence, a generous diet in which cream and milk figure largely, while cod-liver oil, maltine, hypophosphites, iodide of iron, and especially arsenic may be given from time to time. The latter drug has been regarded as a specific. The waters of La Bourboule are said to give good results in some cases. If iodide of potassium has a marked effect, the probability is that the case has a syphilitic basis. Locally, scraping, scarification, and the galvano-cautery are most efficacious. Semon has recorded a case in which, by the persevering use of the galvano-cautery, he effected the permanent cure of laryngeal lupus. It may also be used with good effect in the palate or pharynx. If much pain is present, a sedative insufflation (formula No. 47) or orthoform should be used.

Most surgeons at the present day favour free curetting of the ulcerated surfaces, followed by the application of lactic acid 60 to 80 per cent. In the case of the palate and pharynx, if cocaine anæsthesia is not sufficient for the operation, a general anæsthetic should be employed in order that the scraping be very thorough. If the uvula be much diseased there need be no hesitation in removing it in the usual way. Ramon de la Sota recommends frequent gargling with a one per cent. solution of resorcin in addition to scraping.

In mild cases, or where curetting is for any reason contraindicated it might be well, considering the good results which have been obtained by its use in cutaneous lupoid lesions, to try the effect of thyroid extract, which can be conveniently administered in the form of compressed tablets. For the same reason injection of Koch's and Libbertz's "New Tuberculin" has been recommended. The dose should be used with caution.

We ourselves cannot speak from personal experience in the use of the latter remedy.

In exceptional cases stenosis of the larynx may require treatment, and even tracheotomy may be necessary.

In a case of lupus of the introitus laryngis, after tamponing the trachea, Gané extirpated all diseased tissue by sub-hyoid pharyngotomy. Cicatricial stenosis was prevented by transplantation of the mucous membrane of the circumference. Feeding was at first effected by enemata, but after some days by means of a tube. A cure resulted.

13. SYPHILIS OF THE PHARYNX.

The pharynx may be affected with all three stages of syphilis. The hard sore or *primary syphilis* is met with, and the soft, non-infecting sore also occurs. Besides the cases of primary syphilis of the pharynx due to unnatural causes, there are numerous instances of chancres from the use of infected pipes, spoons, tooth-brushes, and drinking vessels, and from sucking the bottle of a syphilitic child. As illustrating one method of infection, the following case of a soft sore affecting the tonsil may be mentioned. The patient had a soft sore on the prepuce, and having occasion to remove a splinter of bone from the right tonsil, he conveyed the virus to it.

In about 80 per cent. of the cases of primary syphilis of the pharynx, the tonsil is the part affected, as the tonsillar crypts afford a ready ingress to the syphilitic virus. According to Diday, kissing is the most frequent cause of tonsillar chancre. Linderstroem records three cases of tonsillar chancre occurring in the same family within the space of a month.

I (F. de H. H.) have had two patients with the primary sore on the tonsil. Both patients complained of sore throat, and had some discomfort in swallowing. The tonsil was enlarged and felt very hard. There was great enlargement of the glands at the angle of the jaw. The surface of the tonsil was slightly ulcerated, and covered with a greyish slough.

Diagnosis.—The diagnosis of a tonsillar chancre is difficult, because it occurs in different forms. The most typical appearance is the induration of the tonsil, and the unilateral, large, hard, and usually painless swelling at the angle of the jaw.

The points to which attention must be paid in making a diagnosis are the following :—

1. An endeavour must be made to detect the mode of infection.
2. The unilateral development of the chancre and the pronounced enlargement of the glands of the same side.
3. The hardness of the tonsil.
4. The difficulty and sometimes even pain on swallowing, which is always referred to the one side.
5. The absence of a chancre on any other spot.

Very frequently the diagnosis is only made on the appearance of secondary symptoms. Chancre of the tonsil has to be distinguished from a soft sore, from mucous patches occurring on the tonsils, and from later syphilitic ulceration and sclerosis. In both the latter cases the lesions are not so sharply limited to one side, and they are not accompanied by so pronounced a glandular swelling.

In my first case the enlargement and hardness of the tonsil, together with the enlarged glands at the angle of the jaw, gave rise to a suspicion of epithelioma of the tonsil. The rapid response to an anti-syphilitic treat-

ment soon cleared up the difficulty, and it hardly required the eruption, which shortly afterwards appeared, to enable one to arrive at a correct diagnosis. An ulcerating gumma and a tuberculous affection of the pharynx might be mistaken for a primary sore.

Secondary Syphilis of the Pharynx.

As is well known, one of the earliest manifestations of the constitutional effects of syphilis is seen in the pharynx. This may be a simple erythema of the soft palate or fauces which is, as a rule, well defined and of a dusky red colour. The so-called mucous patches are almost pathognomonic. The mucous membrane presents the appearance of a snail track, *i.e.*, it looks as though it had been smeared over with white paint. The patches are often symmetrical, and most frequently occur on the soft palate and tonsil, though any part of the mucous membrane lining the oral cavity may be affected. If the patches become thickened and elevated they resemble the condylomata found at the anus. As a result of these patches, superficial ulceration of the mucous membrane may occur, and there may be slight erosions of the margins of the soft palate and uvula. Symmetrical ulcers may also form on the tonsils and form one of the earliest signs of the disease, they have a grey base and well-defined edges, and do not extend deeply.

The patient complains of a sore throat, and there is usually some discomfort, and occasionally acute pain on swallowing. Condiments, and other irritating substances, will aggravate the symptoms.

Diagnosis.—A diphtheritic deposit may be con-

founded with mucous patches, and *vice versa*, but attention to the general symptoms should prevent this mistake.

Syphilitic and tuberculous ulcerations of the soft palate are at times very difficult to differentiate. Indeed, syphilitic ulceration may become infected with the bacillus tuberculosis. The tuberculous ulceration is a much more painful complaint, and so far from being benefited by anti-syphilitic treatment, it is rather made worse. As in other tuberculous affections, there is generally an evening rise of temperature, and nearly always evidence of lung mischief as well as marked constitutional symptoms.

Tertiary Syphilis of the Pharynx.

In tertiary syphilis three kinds of affections may occur, viz., gummata, ulceration (due to breaking down gummata), and lastly cicatrisation and its results.

When seen before softening has commenced, a gumma is usually a smooth roundish swelling, and the colour of the mucous membrane covering it may not be materially different from that of normal mucous membrane, although it is sometimes hyperæmic. A gumma may be met with in any part of the pharynx, but the posterior wall is the favourite seat. According to Natier it is very rarely located in the tonsils alone. When softening has taken place and the gumma has broken down, an ulcer is formed, and, corresponding to the shape of the gumma, it is usually round or oval.

The ulceration of tertiary syphilis may be either perforating or serpiginous, the latter form especially affecting the soft palate. As a result of the perforating form

of ulceration, the vertebræ may be laid bare, and the spinal cord may become implicated. There are several cases recorded in which portions of the cervical vertebræ have become necrosed, and a purulent discharge has continued until the dead bone has been thrown off. To show the rapidity with which syphilis sometimes advances, a case is reported in which syphilitic necrosis of the atlas occurred a few months after primary infection. As another result of the perforating ulcer, the internal carotid may become eroded and death may take place from hæmorrhage. In yet other instances the soft palate and uvula may be rapidly destroyed, or even the hard palate (in which case the morbid process usually starts from the nose), so that on looking into the mouth a dome-shaped cavity is seen, in which are a few remnants of intra-nasal structures, the whole surface being bathed in a muco-purulent viscid exudation. It is important to bear in mind that there may be a syphilitic affection of the naso-pharynx, without the presence of any apparent change in the lower pharynx, or other part of the body. The amount of deformity brought about by cicatrization is sometimes very remarkable; it is not at all uncommon for the pharynx to be partially or entirely cut off from the naso-pharynx, through the soft palate becoming adherent to the posterior wall of the pharynx; in one case a ring-shaped constriction of the upper part of the pharynx was brought about by ulceration of the posterior and lateral walls of the pharynx, co-existing with gummatous ulceration of the root of the tongue. The most common form of cicatrix, however, is the radiating one found on the posterior wall of the pharynx.

Symptoms.—A gumma situated in the soft palate or pharynx will naturally interfere with deglutition, and

there may be considerable pain. When ulceration occurs these symptoms are intensified. The voice may acquire a nasal twang, owing to the movements of the soft palate being interfered with, and if it be perforated or destroyed by ulceration, fluids will return by the nose. In some cases the ulcers are covered with a viscid secretion, which is a source of great discomfort to the patient. As already mentioned, hæmorrhage may result from some vessel being eroded by extension of the ulcerative process.

When the nares are cut off from the pharynx, by adhesion of the soft palate to the posterior wall of the pharynx, the patient will experience much discomfort from being unable to get rid of the nasal mucus, and from the mouth being dry, owing to the fact that respiration must be carried on through this orifice, instead of by the nose. The senses of smell and taste are lost. In other cases intense earache is produced by cicatricial adhesions round the orifice of the Eustachian tube.

Diagnosis.—Occasionally a gumma will form in the tonsil so rapidly, and with so much febrile reaction, that a quinsy may be suspected, and unless the syphilitic element is recognised at the outset and appropriate treatment started, time will be required to clear up the diagnosis.

For diagnosis from malignant disease see p. 244.

Inherited Syphilis.

The pharyngeal affections of inherited syphilis require separate consideration. A catarrhal or erythematous condition is usually found associated with those nasal conditions, which are termed "snuffles" and to

which attention has already been directed (*vide* Syphilis of Nose). Deep ulceration may invade the bucco-pharyngeal cavity at any period of life, from the first week up to the age of puberty; out of 30 cases, 14 occurred within the first six months. Of the remaining cases, the majority occurred at a period more or less advanced towards puberty. Females are attacked more frequently than males. The peculiarity of these ulcerations is their centrality of position, and their special tendency to attack the bone and eventuate in caries and necrosis. The hard palate is the favourite seat of the ulceration, which, if situated near the posterior part of the palate, generally spreads to the soft palate, and thence to the naso-pharynx and nose. If situated anteriorly, the nose is attacked more directly by perforation of the bone. The fauces, naso-pharynx, posterior wall of pharynx, and nasal fossæ, may serve as the starting point of the ulceration. As a rule deep pharyngeal ulceration precedes, or co-exists with similar affections in the larynx, but the larynx may be affected independently of the pharynx. It is most important to recognise this particular kind of ulceration, because as just pointed out, it often appears first at the period of puberty, and there are cases in which it has been met with even later; moreover, in these patients it is not at all uncommon for the ulceration to be the *sole evidence* of syphilis, hence the risk of confounding inherited with acquired syphilis. As in tertiary syphilis, so in the inherited variety, cicatrisation may result in stenosis of the pharynx, or adhesions between the palate and the lateral or posterior pharyngeal walls.

Treatment.—The constitutional treatment of primary syphilis occurring in the pharynx, when once it has been recognised, differs in no respect from that of

primary syphilis generally. It will, therefore, be unnecessary to say more on the subject. Locally, antiseptic gargles, such as formulæ Nos. 5, 6 and 7, may be ordered.

In secondary syphilitic affections of the pharynx, if the patient has not had a thorough course of mercury previously, he may be ordered one or two grains of blue pill twice or thrice daily; or the same quantity of grey powder, with or without a grain of Dover's powder (according to the presence or absence of bowel irritation) may be ordered. Formula No. 26 is a useful prescription; either this or formula No. 27 may be given three times a day. In some cases the iodide of potassium alone (formula No. 28) will answer best. Locally the tannic acid gargle (No. 3) or gargles Nos. 5, 6 and 7 may be ordered. If ulceration be present the solution of chromic acid (formula No. 35) as recommended by Butlin will be found most useful. The ulcerated patch should be dried with a piece of blotting-paper or lint, and the solution then carefully painted over it. This may be done twice a day. At first the application will cause a good deal of smarting, but this soon passes off, and the patients obtain relief so quickly from the application that there is no difficulty in getting them to continue the painting. In fact there is only one drawback to the lotion, and that is, that under its use the local trouble often heals so quickly, that the patient is apt to neglect constitutional treatment, thinking that he is free from the complaint before this is really the case. The use of tobacco should be forbidden in the presence of secondary syphilitic affections of the pharynx or larynx. In obstinate cases of secondary pharyngeal lesions, the plan of treatment, as carried out at Aix-la-Chapelle, will sometimes succeed when all other plans have failed.

In the treatment of the gummatous and ulcerative stages of tertiary syphilis, almost our entire reliance must be placed on iodide of potassium in large doses, *i.e.*, from 10 to 40 grains, three times a day. In some cases the progress of the cure is accelerated by theunction of a drachm of blue ointment in the axilla every night, but as a rule mercury is not well borne in the tertiary stage of syphilis. The iodide of potassium will often act better if combined with quinine (as in formula No. 22). The general treatment should be of a tonic and supporting nature, milk, eggs, and a fair amount of meat being ordered. Stimulants should be taken with great moderation and only at meal-time.

With regard to local treatment it is necessary first to cleanse the surface of the ulcer; this can be done most conveniently by means of the hand-ball spray apparatus, a simple alkaline fluid (formula No. 50) being used for the purpose. When the surface is clean, iodol or iodoform may be applied to it by means of an insufflator. A solution of sulphate of copper (formula No. 37) will, however, be found to yield the most satisfactory result.

In cases of ulceration of the pharynx attended by dysphagia, the insufflation of orthoform will give great relief.

The treatment of adhesions between the soft palate and the posterior wall of the pharynx is less unsatisfactory than formerly. W. G. Spencer has successfully operated upon a case in which the naso-pharynx was shut off from the pharynx and in which great complaint was made of earache and mastoid pain. The adhesions of the palate and pharynx were divided by means of a curved cleft palate knife, and the soft palate then stitched forward to the muco-periosteum of the hard

palate. The stitches cut out in about a week's time, but the adhesions did not recur. Other successful cases have since been reported. The nasal passages should be kept patent anteriorly and posteriorly by means of dilators passed daily at first, and then with diminishing frequency.

The pharyngeal affections of inherited syphilis require to be treated on similar lines to those employed in tertiary syphilis.

14. PARASITIC AFFECTIONS OF THE PHARYNX.

Pharyngo-mycosis.

It need hardly be mentioned that the same parasites as are found in the mouth also attack the pharynx. Thrush, for example, almost invariably appears on the tongue or buccal mucous membrane before the pharynx is affected. Thrush is due to the presence of a vegetable parasite, the *oidium albicans*, and it is now generally admitted that this is identical with the *oidium lactis*, the ferment fungus, on the presence of which depends the acid fermentation of milk. This is the most common form of vegetable parasite met with in the mouth. When the white membrane of thrush is examined microscopically, it is found to be composed of spores and filaments with a granular basis. Thrush is for the most part a disease of infancy, occurring almost exclusively in children brought up by hand, but it may be met with in old people and in persons exhausted by some wasting disease, such as cancer or phthisis. Thorner has recorded a case of thrush of the pharynx and nose in an adult, whose vitality had been greatly

lowered by an unusually severe attack of influenza, but who nevertheless recovered. According to most authorities, thrush is limited to those parts of the mucous membrane which are lined with squamous epithelium, but in this case, Thorner was able to watch the gradual extension of the fungus from the pharynx to the naso-pharynx and thence into the nostrils.

The disease commences with the formation of circular spots about the size of a pin's head, slightly elevated and of a white colour. If the course of the disease be unchecked, the spots gradually coalesce, until in some cases the mucous membrane of the pharynx is covered with patches of a whitish colour. The membrane is at first slightly adherent, so that a little oozing of blood follows attempts to remove it. Thrush is usually ushered in with some febrile disturbance and gastrointestinal irritation, such as sickness, diarrhœa, and abdominal pain and tenderness. In cases running a fatal course, the patient becomes drowsy, there is profuse diarrhœa with foul-smelling stools, and the nates and anus become red and excoriated.

The *mycosis sarcinica* composed of *sarcinæ*, and the *aspergillus mycosis* are also very occasionally met with in the throat.

In *mycosis leptothricia* the parasite is the *leptothrix buccalis*. The deposit consists partly of long, fine threads, partly of tufts and sheaves, and also of various kinds of cocci. It occurs in shiny, white patches on an inflamed mucous membrane. The uvula and the soft palate are the parts most generally affected, but it may grow on neighbouring surfaces, *e.g.*, pharynx, naso-pharynx, and larynx. Pharyngo-mycosis is met with at all ages, and a lowered condition of the general health appears to be an important predisposing cause in ren-

dering it possible for the *l. buccalis* (which is constantly present in the secretions of the mouth) to undergo an exuberant growth. The onset of the disease may be associated with malaise and fever, while the local symptoms consist of pain on swallowing, faucial discomfort, and possibly enlargement of the sub-maxillary glands. The white patches can be easily removed with a wool brush, and microscopically are found to consist of masses of *leptothrix buccalis*. The diagnosis is most likely to be confused with that of pharyngo-keratosis, but a careful study of the characteristic appearances and symptoms of the two will leave little doubt as to the true nature of the case.

Pharyngo-keratosis.

For a long while this disease has been confused with pharyngo-mycosis, and has been supposed to be due to a similar cause, but the recent researches of Siebenmann, Kelly and others, have shown that the two diseases have little in common. Pharyngo-keratosis is "characterised by the presence of small, isolated, tough, firmly adherent white excrescences or plaques seated on an apparently healthy mucous membrane" (Kelly). They vary in size from a mere white point to a distinct elongated horn-like excrescence, and are found most frequently on the faucial tonsils and base of the tongue, occasionally in the naso-pharynx and lateral pharyngeal walls.

The symptoms produced by these growths are so slight that often they remain undiscovered. At other times they may induce certain pricking or tickling sensations in the throat giving rise to cough or other reflexes. The general health is usually excellent, and

remains unaffected by the presence of the disease, the tendency of which is to disappear as insidiously as it appeared, and this whether treatment be directed to it or not.

Pharyngo-keratosis is slightly more common in women, and occurs between the ages of 15 and 40, more generally about the prime of life. We have no knowledge as to the predisposing or direct causes of the affection. It has been noted that it often occurs in association with chronic lacunar tonsillitis.

Morbid Anatomy and Pathology.—The researches of Heryng, Siebenmann, Kelly and others have shown that the disease is essentially a keratosis, mainly affecting the epithelium lining the tonsillar crypts, but not entirely confined to this region or tissue.

The excrescences have been shown by the last-named observer to be made up of cornified epithelial cells, the borders and extremities of which are less dense than the central parts, and in the interstices are found microbes and leptothrix filaments. He has also shown conclusively that the latter fungus has no essential connection with the keratosis—its presence is to be explained merely by the fact that the excrescence, like the tonsil crypts themselves, form a suitable nidus for the development of the fungus. Cases are on record where no leptothrix has been found associated with the epithelial excrescence.

Diagnosis.—This depends upon the recognition of the features as to appearance, site, adhesion and toughness, absence of local inflammation and constitutional disturbance, which have been already mentioned and which will serve to eliminate diphtheria and pharyngomycosis. In doubtful cases a bacteriological examination would clear up the difficulties.

Prognosis.—When thrush occurs in adults or old people, it generally indicates a great want of vital power, and it is therefore of grave prognostic import. The other forms of mycosis are rather matters of clinical interest than of anxiety, though at times the cure of the disease demands careful and protracted treatment.

Treatment.—In cases of thrush the important indication is the observance of the most scrupulous cleanliness in food utensils; in children especial attention being paid to the state of the bottle and the inside of the teat. The pharynx should be carefully swabbed out two or three times daily with a weak solution of carbolic acid, permanganate of potassium, or sulphurous acid. In the interval spray No. 50 may be used. In a very severe case occurring in an adult under my (F. de H. H.) care, the administration of an effervescing lozenge containing $\frac{1}{8}$ -grain of cocaine and 5 grains of chlorate of potassium, every three or four hours, speedily effected a marked improvement in the local condition, and enabled the patient to take food without pain. As regards mycosis leptothricia, treatment directed to improvement of the general health, aided by the use of antiseptic gargles or pastilles, is generally followed by speedy disappearance of the fungus.

The treatment of pharyngo-keratosis is rather unsatisfactory, in that it is extremely difficult to eradicate the fungus from the crypts in which it grows. The symptoms are usually very insignificant and often the general health is excellent, so that it is in our opinion unnecessary to treat the milder cases at all. The patient should be advised of the harmlessness of the condition, and that it will gradually disappear as the tone of the general health improves or is maintained.

The occasional sucking of a simple alkaline pastille

may be ordered as a placebo. In more extensive cases, especially if the tonsils are swollen, the latter should be excised or reduced by "morcellement" (*vide infra*), and any remaining keratoid elements burnt with the galvano-cautery, the fine point of which is passed into the fundus of the crypt. In other instances excellent results may be obtained by screwing into the crypts of the gland orifices a fine probe thinly but firmly covered with cotton-wool dipped in a solution of salicylic acid in absolute alcohol (1 in 4). This must be applied carefully by the surgeon, and a weaker solution (1 in 8) may be used by the patient night and morning.

15. FOREIGN BODIES IN THE PHARYNX.

The majority of the foreign bodies, which become lodged in the pharynx, find their way there through being taken with food. This fact should be borne in mind in the event of a person becoming unconscious and cyanotic while eating. Such experiences have been recorded, and in one case tickling the fauces with a feather produced a desperate gulp or two, which ended in the ejection of a large piece of meat.

As a result of the funnel-shaped narrowing of the pharynx, and of the greatest narrowing being at the level of the cricoid cartilage, most foreign bodies become impacted here, if they are arrested in their downward course. If they are sufficiently large, they may block the larynx and cause death from suffocation. Small sharp bodies cause pain, give rise to injuries, and produce dysphagia. They often lodge in the tonsils, pillars of fauces, or upper parts of the pharynx. Transparent fish bones are often difficult to see and are very

closely simulated by a string of mucus. A needle has been known to set up subcutaneous emphysema of the throat, and then to pass into the stomach, and be discharged per rectum without doing further damage. Rivington records a case in which the left common carotid artery had to be ligatured, in consequence of its having been wounded by a fish bone, which had penetrated the pharynx. In an appendix to his paper Rivington has arranged an abstract of 44 cases of wounds of blood-vessels by foreign bodies introduced through the mouth. An examination of these cases shows the danger of passing bougies or probangs for the purpose of clearing the pharynx or œsophagus of sharp pointed bodies. Rivington was of opinion that in his case the injury to the carotid was produced by the probang pushing the fish bone through the wall of the pharynx, and he quotes Wagret's case as a striking example of this risk: "After a physician had made attempts at the propulsion of the bone, the patient experienced entire relief, and said to his benefactor that he thanked him very much, and that he had saved his life. A few days later the patient died from perforation of the descending aorta."

The great risk of people going to sleep with dentures in the mouth is illustrated by the numerous cases in which a set of false teeth has become impacted in the pharynx. The irregularity in shape of these appliances much interfering with their downward progress, the wonder is that they ever pass safely through the intestinal tract. We must also bear in mind the numerous instances in which patients have given the most graphic account of how such dentures have been swallowed, a history which is borne out by certain symptoms from which they appear to be acutely suffering at the time,

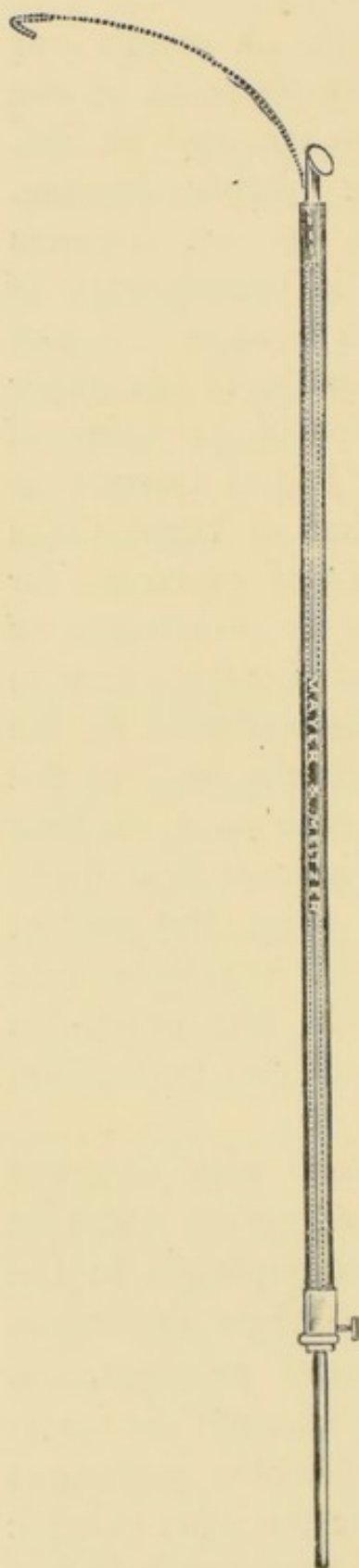


FIG. 49.—Howard Marsh's Probang.

and yet possibly after an operation has been performed, with a fruitless search for the foreign body, the latter is discovered under the patient's pillow, or on the floor of his room.

Treatment.—The first essential is careful examination of the fauces and pharynx, by means of a reflected light, the tongue being held down with a tongue depressor. If the foreign body be seen sticking into a tonsil or into the fauces or upper part of the pharynx, it can be removed with forceps. If it be not seen, a careful search should be made of the lower faucial regions and base of tongue with a laryngoscopic mirror. Possibly a small ecchymosis will indicate the position of the foreign body. If the examination be unsuccessful, the finger should be gently inserted, and a search made in the regions already named, but no force must be used in pushing about the foreign body, lest it be made to penetrate deeper and inflict serious injury. Often when its position is thus located or its position altered, it can be removed with curved forceps, *e.g.*, Durham's curved alligator forceps. Failing all attempts

at removing it in these ways, the umbrella probang or Marsh's instrument (fig. 49) should be made use of, or the patient induced to eat several mouthfuls of new bread, thick porridge, &c. In the event of the foreign body passing into the stomach, aperients should be avoided, and the patient's diet should be restricted to potatoes, of which he should take as many as possible. Billroth is of opinion that, since the introduction of this procedure, gastrotomy for foreign bodies should become an obsolete operation. Others have advised the use of an emetic, but this may involve driving the foreign body further into the tissues if it be of a sharp nature. In the case of large bodies, such as tooth dentures, if forceps are unavailing, pharyngotomy may be necessary. In children the index-finger will probably alone be available for examination purposes.

When the nature of a foreign body renders them suitable for detection by the Roentgen Ray apparatus, this method of examination is extremely valuable, and may give information and save an amount of pain and discomfort, unattainable by any other method we at present possess. It is especially suitable for the detection of metallic foreign bodies lodged in the lower pharynx, larynx, or œsophagus.

In connection with the subject under consideration, it must be remembered that foreign bodies may penetrate the soft palate and become fixed there, or substances may be expelled from the stomach in the act of vomiting and become impacted in the naso-pharynx, or even enter the choanæ. The surgeon must always take care not to be unduly led away by the patient's description of where he feels the foreign body lodged, for sensation in these cases may be very misleading, *e.g.*, the patient may indicate by his finger, placed externally, that the

foreign body is lodged below the level of the tonsil, and yet it may be found in the naso-pharynx. Reflex sensations are very misleading in the throat. As in the eye, so in the throat, the sensation as of a foreign body may remain for some while after it has been removed.

16. NEUROSES OF THE PHARYNX.

Under this head are included—

- (A) Altered conditions of the motor nerves, giving rise to (1) spasm; (2) paralysis; and
- (B) Altered conditions of the sensory nerves—(1) anæsthesia; (2) hyperæsthesia; (3) paræsthesia; (4) neuralgia.

These neuroses may either have their origin in the higher centres, in the peripheral nerves, or occur as reflex phenomena.

(A) *Motor Neuroses of the Pharynx.*

(1) Spasm of the pharyngeal muscles may be due to hysteria, and gives rise to the sensation of a ball in the throat, the *globus hystericus*. In some cases there are spasmodic contractions of the pharynx, occurring as often as forty to sixty times in the minute, during which air is swallowed, frequently in large quantities. This causes distension of the stomach and troublesome flatulence. In other cases pharyngeal spasm arises from more definite lesions, *e.g.*, it is a well marked symptom in rabies.

(2) Paralysis of the palatal and pharyngeal muscles is met with in labio-glosso-laryngeal paralysis, in peripheral neuritis following diphtheria and influenza, and

as the result of disease of the meninges or of the bones of the base of the skull.

The symptoms are a thickness and nasal intonation of the voice, with difficulty in swallowing and a tendency for food, especially liquids, to return through the nose. When these patients speak the escape of air through the nostrils is very noticeable. When the paralysis is unilateral, the palate is lower on the weak side owing to the unconstrained action of the palatoglossus and pharyngeal muscles; when bilateral there is no movement when the patient says "Ah."

Cases of paresis of these muscles have been described in which the affection is assumed to be of a myopathic origin, the muscular fibres being weakened by extension of the inflammatory process from the mucous membrane covering them. That the difficulty in swallowing is not due to stricture is proved by the passage of a bougie. On examination it is found that the muscles do not respond so briskly as usual to the irritation of a probe, and that there is diminished response to faradism. In some of these cases hysteria plays a prominent rôle.

Treatment.—In hysterical spasms the cold douche to nape of neck and chest, the administration of antispasmodics, such as bromide of potassium and valerian, or the valerianate of zinc, followed by tonics, change of air, and moral treatment, usually suffice to effect a cure.

In the cases in which the pharyngeal affection comes on as a result of labio-glosso-laryngeal paralysis nothing can be done. Where diphtheria or influenza is the cause, rest, change of air, and the administration of iron and strychnia in full doses, will usually have a good effect. The application of a faradic current, both externally and internally, is exceedingly useful. When the paresis is apparently of myopathic origin, the

patient should be fed on liquid but stimulating food, and the same treatment should be carried out as is used for diphtheritic paralysis.

(B) *Sensory Neuroses of the Pharynx.*

(1) Anæsthesia of the pharynx is met with in hysteria, diphtheria, chronic bulbar paralysis, peripheral pressure on a glosso-pharyngeal nerve, and is sometimes found in insane patients who have no paralysis elsewhere. This diminution or absence of sensation in the pharynx will sometimes be found of assistance in the diagnosis of hysteria.

(2) Increased sensibility (hyperæsthesia) is met with in neurotic patients, especially those of an hysterical temperament.

(3) Perverted sensibility (paræsthesia) of the pharynx is a very common and troublesome symptom to treat. It occurs most frequently in women, especially about the menopause, and in neurotic patients generally. It is also occasionally a premonitory symptom of pulmonary phthisis or malignant disease of the upper air passages. The possibility of paræsthesia of the pharynx being due to reflex disturbance, as, for example, swelling of the inferior or middle turbinals, should be borne in mind. Patients complain of the sensation of a foreign body in the throat, a feeling of constriction or sense of suffocation, tickling, itching, burning, or dry feelings in the throat. Frequently accompanying these sensations is an irritable, oftentimes barking, cough. It is most important that a careful examination of the nose, nasopharynx, and base of the tongue should be made, as these symptoms are sometimes due to changes in the mucous membrane of the pharynx, &c., *e.g.*, granular

pharyngitis, enlargement of the lingual tonsil, and it is not until every possible cause has been excluded, that the diagnosis of a purely neurotic affection should be made.

Indigestion, and conditions causing or depending upon anæmia are prolific sources of throat discomfort. At the menopause women are particularly liable to suffer from sensory throat neuroses, and according to Semon paræsthesiæ are the most common.

It will be seen that the description of paræsthetic sensations given by patients is as varied as that of "tinnitus," and as Semon remarks, the sensations vary in intensity from a mere inconvenience to a very real trouble, often because the patient regards them as a forerunner of some grave disease.

We have already stated that there may be little or nothing seen on examination to account for these abnormal sensations, and the difficulty is to avoid unnecessary treatment and yet not to ignore the possibilities for evil of some small lesion *e.g.*, a slightly enlarged lingual tonsil.

(4) Neuralgia of the pharynx is a rare condition. There are, however, cases of acute lancinating pain, coming on in paroxysms and referred to the tonsils and pharynx, in which on the most careful examination nothing objective can be seen.

Treatment.—Any cause of irritation which exists should if possible be removed. The condition of the digestion should be inquired into ; if there are signs of engorgement of the portal system, a mercurial pill followed by a saline aperient will be beneficial. The diet requires to be regulated ; spiced articles of food, pepper and mustard are best avoided ; excess in alcohol and tobacco is injurious. Anæmic patients should be treated by the administration of iron, arsenic, and cod-

liver oil. In cases occurring at the menopause, bromide of potassium and nervine tonics will be found of great service. Change of air, and especially a sea voyage, will often have a good effect. Réthi obtained a cure in one case of neuralgia of the pharynx by cauterising the painful points with chromic acid.

17. THE TONSILS.

Before proceeding to discuss the diseases of the tonsil, it may be worth while to point out that, at present, we have no real knowledge concerning the functional use of these lymphoid masses. Observations have shown that there is a free phagocytic migration from the interior to the surface of the tonsils, and possibly these wandering cells exercise a protective function in destroying many of the septic organisms so constantly present in the mouth. The fact, however, that in the majority of healthy adults the tonsils are conspicuous by their absence shows that this function is not of great importance. On the other hand, increasing evidence goes to show that the crypts form excellent culture tubes for various septic and pathogenetic micro-organisms, against the invasion of which the outwandering phagocytes are often powerless to protect the individual. When it is borne in mind that recent researches have shown that the tonsil may be the seat of primary and secondary tubercular deposit, that in scarlatina, measles, diphtheria and rheumatic fever, the tonsillar lesion is often the earliest, and in some of them the most prominent lesion, it will be obvious what an important part is taken by the tonsils as a portal of infection for various micro-organisms of disease.

The importance of the "supra-tonsillar fossa" (His) as a starting point of infection has recently been brought forward by Paterson.

This space is a remains of the lower half of the second branchial cleft, and is situated above the upper part of the tonsil, between the anterior and posterior pillars of the fauces. The cavity varies much in size, it may extend into the soft palate towards the uvula, or in the direction of the naso-pharynx, and in other cases

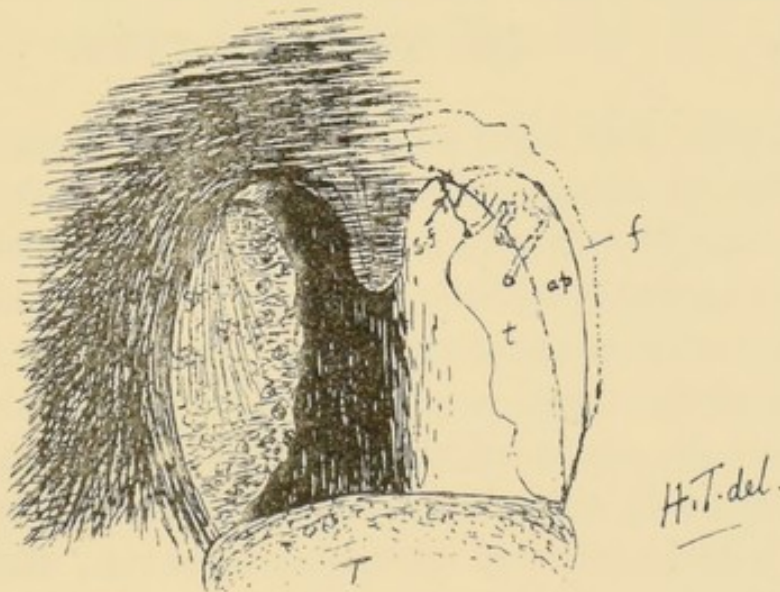


FIG. 50.—Showing relation of tonsil to supra-tonsillar fossa. *t* Tonsil, *sf* showing entrance into fossa behind upper extremity of *ap* anterior pillar of fauces, *f* extension of fossa to outer side of tonsil (dotted line). *T* tongue.

it dips down on the outer side of the tonsil, and comes into close relation with the superior constrictor of the pharynx (fig. 50).

As a general rule its communication with the mouth is sufficiently free to prevent any accumulation of septic products within the cavity, but on the other hand, recurring attacks of tonsillar inflammation may so narrow the outlet that the septic contents (consisting of epithelial scales, leptothrix fungus, pus cells and various micro-organisms) accumulate under consider-

able tension and give rise to inflammation of the tonsil, which may take the form of lacunar or peritonsillar inflammation, or by undergoing inspissation, the retained material may in time form a tonsillar calculus. The fossa is in free communication with the upper lacunæ of the tonsil. A strabismus hook will be found an excellent instrument for investigating this vestigial cavity.

18. TONSILLITIS.

Under the head of acute tonsillitis we include four forms of acute inflammation of the tonsil, viz., (1) lacunar (formerly called follicular) tonsillitis, (2) parenchymatous tonsillitis or quinsy, (3) peritonsillitis in which the connective tissue surrounding the greater part of the tonsil is primarily involved, and (4) the rare forms of acute ulcerative tonsillitis. We have not included in this classification what some would regard as a fifth form of inflammation, viz., those cases in which the tonsil takes part in a more general acute pharyngeal inflammation. All these varieties have much in common as regards their ætiology, symptoms and treatment, so that it will be convenient to consider them together, pointing out their chief differences.

Ætiology.—Tonsillitis is essentially a disease of adolescence and early adult life, being rare before ten and becoming less frequent after thirty. Cases have, however, been recorded of tonsillitis occurring in infancy (a case of quinsy at seven months of age has been reported) and also in extreme old age. It is now almost universally agreed that there is an intimate connection between tonsillitis and acute rheu-

matism. The frequent association of the two diseases, and the fact that in many instances they are produced by almost identical causes tend to support this view. Some authorities have even questioned whether the poison of rheumatic fever does not gain access to the general system through the tonsils. Exposure to cold, wet, or sudden changes of temperature is, therefore, a common exciting cause of tonsillitis, and, as in rheumatism, heredity plays an important part. Lacunar tonsillitis often occurs in epidemics, more especially at the spring and fall of the year; this is not the case with quinsy.

The connection between gout and tonsillitis is much less marked, but it is probable that quinsy is more common in people of a gouty inheritance than in others. Cases are met with in which acute tonsillitis has preceded an attack of gout, and the throat trouble disappeared as soon as the joint mischief manifested itself. Insanitary conditions, such as exposure to sewer gas, impure drinking water, over crowded hospital wards, &c., are powerful agents in the production of sore throat—hence the term “hospital sore throat.” It is highly probable that in these cases some septic poisoning is at the root of the evil. Tonsillitis has been known to follow intra-nasal operations. In susceptible persons the inhalation of air impregnated with coal gas will cause an attack of tonsillitis.

Contagion is undoubtedly an important means of favouring the spread of tonsillitis. All forms of this disease are more or less contagious, quinsy being probably the least contagious; whereas in lacunar tonsillitis there are all degrees of contagion, which in some cases almost equal that of diphtheria. Tonsillitis may be an early symptom of some of the acute exanthems,

e.g., scarlet fever, and again it is a common manifestation of secondary syphilis. A frequent cause of recurring attacks of tonsillitis is an accumulation of septic matter (micro-organisms, epithelial debris, pus cells) in the supra-tonsillar fossa (*vide supra*). We do not think that the importance of this source of trouble is sufficiently recognised.

Anything which exhausts muscular or nervous energy, such as overwork and anxiety, favours the occurrence of tonsillitis; this is especially the case in persons who have suffered previously from the affection, as a former attack seems to predispose to subsequent ones.

Morbid Anatomy and Pathology.—We are still far from being able to speak definitely as to the nature of tonsillitis. Some authorities are disposed to regard it as essentially a manifestation of the rheumatic diathesis, and there is much to be said in favour of this view. There are others, however, who hold the opinion that it is an acute infectious disease, and that the shivering which ushers in the attack, the rheumatic pains and the high temperature, are to be considered as the expression of the general infection of the system. Tonsillitis with severe febrile symptoms and albuminuria suggests the absorption of an infectious substance through the tonsils. In the so-called hospital sore throat the septic nature of the affection is manifest, and its occurrence should lead to a careful overhauling of the surrounding sanitary arrangements.

Various micro-organisms (staphylococci, streptococci, diplococci) and a bacillus very similar to the Klebs-Loeffler bacillus of diphtheria have been found in the secretion from the tonsils, and in the tonsils themselves, but much work still remains to be done in this direction to clear up the precise connection between these organ-

isms and tonsillitis. As a general rule, the greater the proportion of streptococci the greater tendency is there for the inflammation to spread, and be complicated by systemic infection, whereas, when staphylococci predominate the results are more local, and constitutional effects less marked. In some cases a distinct exudation is seen on the surface of the tonsil resembling diphtheritic membrane.

In lacunar tonsillitis the small depressions or lacunæ of the tonsils become inflamed and blocked with a soft yellowish-white substance, consisting of fibrinous lymph, epithelial cells, micro-organisms and *débris*. The disease, according to Sendziak and others, is due to direct infection of the lacunæ by the micro-organisms already enumerated. Lacunar tonsillitis hardly ever goes on to suppuration, but occasionally cases, which in their outset resemble it, later on suppurate like a quinsy. In parenchymatous tonsillitis or quinsy there is an inflammation of the tissue of the gland itself, which in the severer forms goes on to the formation of an abscess. In peri-tonsillitis the suppuration takes place in the connective tissue in which the tonsil is imbedded. To these cases the term "peri-tonsillar abscess" is more correctly applied. In these instances the primary source of inflammation is possibly one of the follicles in close contiguity to the surrounding connective tissue, or even more probable still is the view, put forward by Paterson, that the inflammation is due to a source of infection arising in the supra-tonsillar fossa. In confirmation of this is the fact that a peri-tonsillar abscess nearly always points in the region of the fossa.

In the fourth form or "acute ulcerative tonsillitis" must be included those rare cases in which the surface

of the tonsil is occupied by a well defined ulcer, the surface of which is occupied by a yellow grey slough. The edge of the ulcer is very hyperæmic and the faucial region much congested, but the tonsil itself is little swollen.

Symptoms.—An attack of acute tonsillitis usually comes on with febrile disturbance, malaise and aching in the limbs. It may be preceded by a feeling of chilliness or even a distinct rigor. Stiffness in the neck and pain in the throat soon supervene; the pain is sometimes of an agonising character, shoots into the ears, and is increased by opening the mouth or attempting to swallow. There is a constant desire to swallow, but the difficulty in doing this is so great that the secretions dribble out of the mouth, and if fluids are taken they frequently return by the nose. The tongue is coated and the breath offensive, the bowels confined and the urine diminished in quantity, of high specific gravity, rich in urea and urates, and deficient in chlorides. The voice is thick and guttural, there is often deafness, the patient snores when asleep, and the breathing is sometimes noisy even when he is awake. The pulse is considerably increased in frequency, and at first may be full and bounding. The temperature may rise to 105° Fahr. or even higher, but more commonly it ranges between 101° and 104° . All the symptoms are more marked in the parenchymatous form than in lacunar tonsillitis, and the pain, difficulty in swallowing and breathing, attain their maximum just before the pus is evacuated, when the patient may suffer excruciatingly.

On examining the throat in a case of lacunar tonsillitis, both tonsils will usually be found enlarged, and the surface dotted over with spots of a yellowish-white colour, due to retention of secretion in the lacunæ.

Occasionally these spots coalesce, so that a considerable portion of the tonsil may be covered by the exudation.

In parenchymatous tonsillitis, the tonsil and adjacent parts will be found greatly swollen, of a deep purple-red colour, and often covered with viscid mucus. Usually only one tonsil is affected, but the other is frequently attacked just as the patient is hoping that he has passed through the worst of his illness. There is enlargement of the glands at the angle of the jaw, and the side of the neck may be much swollen. In the third variety of tonsillitis (peri-tonsillitis) the tonsil, soft palate, and fauces are red and swollen, and the uvula sometimes œdematous. The main swelling is seen to be in the upper tonsillar region, corresponding closely to the position of the supra-tonsillar fossa. The appearances of acute ulcerative tonsillitis have already been described, and considering the intensity of the local process, it is surprising that the constitutional symptoms are not more marked. When the tonsils merely share in a general inflammatory state of the pharynx, they are redder than natural and the mucous membrane is swollen and relaxed. In ulcerative tonsillitis (hospital sore throat) the tonsils and fauces are swollen and small white superficial ulcers are seen. The loss of strength and general depression, which accompany this form of sore throat, are much more marked than in the other varieties of tonsillitis, and point to the septic origin of the disease.

Though the symptoms of the three forms are so similar, it is to be noted that there is an essential difference between them, for it is found that the person who has had one attack of quinsy will in the event of a second attack of tonsillitis again have a quinsy, and the same holds good for lacunar tonsillitis, so that one cannot

regard the latter as being a milder form of parenchymatous tonsillitis. It is important to remember that obscure attacks of fever in children frequently depend upon a tonsillitis, otherwise running a latent course; hence it is advisable to examine the throat in all cases of feverishness. Similarly it should be a rule always to examine the body for a rash in cases of tonsillitis, especially when they occur in children.

Complications and Sequelæ.—The following complications have been met with, though fortunately only rarely, in connection with an attack of tonsillitis, viz., otitis media, cardiac disease (either endo- or pericarditis) and acute rheumatism. Orchitis and ovaritis of infectious origin (as in typhus and mumps) are also rare complications. Albuminuria is occasionally present in cases where the temperature is high. In such cases it will be noted that the albumen disappears with the fall of temperature (c.f. diphtheria and scarlet fever).

In very exceptional cases of suppurative tonsillitis the pus has passed along the deep fascia into the mediastinum, setting up pleurisy and causing death. Infective phlebitis, peritonitis and general septic infection have been noted as sequels of lacunar tonsillitis.

In chronic cases of lacunar tonsillitis the little caseous plugs in the lacunæ may cause the breath to be foul. As a result of a past tonsillitis, a chronic abscess may form in the tonsil, similar to the chronic abscesses occurring in scrofulous patients after inflammation of the lymphatic glands, but most of these tonsillar abscesses arise in connection with the supra-tonsillar fossa. Cases have been recorded in which paralysis has followed what appeared to be lacunar tonsillitis; the probability that these were really cases of diph-

theria must always be borne in mind, although no Klebs-Loeffler bacilli may have been found, otherwise we are driven to suppose that, under certain conditions, toxins may be developed in the lacunæ during lacunar tonsillitis, which produce a peripheral paralysis similar to that following certain cases of diphtheria.

Diagnosis.—This is easily made as regards quinsy; the suddenness of the onset, the rapid enlargement of one tonsil, and the great pain are quite characteristic. It is possible that a gumma may form so quickly in the the tonsil as to mislead at first, but the more chronic nature of the affection will soon awaken suspicion. There is frequently considerable difficulty in distinguishing between lacunar tonsillitis and diphtheria; in fact there are transition forms in which differentiation is impossible, *e.g.*, those cases of tonsillitis which are sometimes met with in a house where diphtheria has occurred, and which are followed by paralytic sequelæ. Diphtheria may commence with the appearance of tonsillitis, and only later on manifest the clear signs of its real nature, just as when cholera is epidemic, it is difficult to distinguish simple diarrhœa from choleraic diarrhœa. In diphtheria the patches are of a whitish or ashy-grey colour, cover a larger area, are not dotted about as in lacunar tonsillitis, and leave a bleeding surface on attempts at removal. The patches of false membranes are also seen on different mucous surfaces at the same time, *e.g.*, tonsils and soft palate, pharynx, larynx or nose, or they may gradually extend from one to the other. Moreover, the onset of diphtheria is more insidious, there is a greater tendency to asthenia, as shown by the frequent pulse and occasional death by heart failure, the temperature as a rule is not so high, albuminuria is generally present, paralytic sequelæ are

frequent, and the disease is very infectious. The deposits on the tonsils due to mycosis may be mistaken for lacunar tonsillitis; they are, however, exceedingly difficult to remove and are often found in other parts of the pharynx, whereas in the latter disease the deposits are easily removed and are located in the crypts. A microscopical examination will solve the difficulty. In acute ulcerative tonsillitis, the clean cut ulcer, with bright red edges and the yellowish-grey slough, could only be mistaken for a suppurating gumma, from which the history and effects of treatment would easily differentiate it.

Prognosis.—Recovery is almost the invariable result in lacunar tonsillitis, and it is difficult to see how death can be brought about by it, in the absence of any grave complication. In quinsy also recovery may be confidently expected; death has, however, occurred in a few cases from the bursting of the abscess and the entrance of the pus into the larynx causing suffocation. As has already been mentioned, the pus may burrow down the fascia, and entering the mediastina may give origin to a fatal pleuritis. Death from hæmorrhage due to sloughing of the walls of one of the neighbouring vessels has been recorded, but this has only been noticed when the tonsillitis was of a gangrenous nature. Very rarely tonsillitis may set up œdema of the larynx, and death may occur with startling rapidity. It must always be borne in mind that tonsillitis may be the early manifestation of one of the acute exanthems or the forerunner of a septic pharyngo-laryngitis, and hence if no rash be present on the body when the case is first seen in its early days, or it is in any way anomalous, a guarded prognosis should be given.

Treatment.—If, as is generally the case, the tongue

be furred and the breath foul it is advisable to commence treatment by giving three grains of calomel, followed by a saline aperient. Regarding lacunar tonsillitis as a very frequent manifestation of the rheumatic diathesis, a combination of 10 or 15 grains of the salicylate of sodium with 10 grains of the bicarbonate of sodium in cinnamon water, or some other suitable vehicle, is as useful as any other drug. In considering the effect of treatment it must be borne in mind that lacunar tonsillitis runs a pretty well defined course of three or four days, and hitherto no specific has been found which will materially shorten this period. Salol in doses of 10 grains every two hours during the day has recently been highly recommended. Not less than 60 grains should be given in the twenty-four hours, nor more than 120. As a rule about 90 grains will suffice for an adult. As the drug is insoluble it may be given in powder form, or as an emulsion. Salol may also be employed in parenchymatous tonsillitis, but it is not so efficacious in this disease. Benzoate of sodium in 5 to 15 grain doses every one or two hours is said to cure acute lacunar tonsillitis in from twelve to thirty-six hours. Guaiacum is a remedy which has long enjoyed a reputation in the treatment of acute pharyngeal affections, and we have known people subject to quinsy, who were confident that they had averted threatened attacks by the prompt use of this remedy. Drachm doses of the ammoniated tincture may be given every two hours in hot milk until slight purging is produced. The advantage of the method is that the hot milk can be held in the back of the throat, before being swallowed, and thus acts as a sort of internal fomentation. Guaiacum powder may be given in doses of 5 grains mixed with black currant jam

every two hours, or the trochisci guaiaci of the Throat Hospital Pharmacopœia may be ordered. If the temperature range high, two-minim doses of tincture of aconite every half hour for two or three doses, and then at less frequent intervals, will have a good effect. Phenacetin or antipyrin in 5 to 10 grain doses every two or three hours for two or three doses is sometimes useful. These drugs both relieve pain and also bring down the temperature. In gouty cases, colchicum and alkalies answer best.

In hospital sore throat a stimulating plan of treatment is required from the beginning. Medicinally, acid and bark, or full doses of the tincture of the perchloride of iron, with or without quinine, are indicated.

As regards the local treatment of acute tonsillitis, the first thing to be said is that gargles are useless. Anyone who has himself suffered from tonsillitis would certainly not order a gargle after having had personal experience of its use. Small pieces of ice may be sucked and will often give relief. Moistening the index finger, then dipping it into bicarbonate of sodium and rubbing it over the inflamed tonsils, has been highly recommended and is certainly worth a trial. The application should be made every five minutes for half an hour, and then once every hour for the rest of the day; afterwards two or three times a day are sufficient until the inflammation has subsided. In quinsy the application of a 20 per cent. solution of cocaine is most serviceable; in some cases it appears to arrest suppuration, and in all it relieves pain and enables the patient to take nourishment. The solution should be swabbed over the fauces two or three times a day as long as swallowing causes pain, and advantage should be taken of its local anæsthetic action to give the patient, about five minutes

after the application, a meal of bread and milk, or egg beaten up with milk or brandy. Others highly recommend equal parts of guaiacol in olive oil as a local application; it should be painted on with a thick wool swab. The initial discomfort of its application soon passes off. A solution of menthol in liquid paraffin (grs. x. to xv. ad ʒj.) has its advocates on account of its anæsthetic and antiseptic action. Spraying the tonsils with a very hot alkaline solution, to which listerine is added, gives very great relief, at the same time it removes the morbid secretions from the surface of the tonsil and its crypts. According to Hovell the pain on swallowing in acute tonsillitis can be almost completely prevented by pressure applied just in front of the tragus of the ear on each side. The question of incising the inflamed tonsil has been much discussed. We do not consider that an inflamed tonsil should be incised unless pus is present, for the relief obtained by scarification in the early stages of inflammation is not proportionate to the pain which the little operation causes, and we should content ourselves with the application of cocaine and hot alkaline sprays. When it is clear that suppuration is present the patient should not be left in pain. Immediate relief in these cases may generally be effected by incising the tonsil, using for this purpose a tonsil bistoury or small scalpel protected by strapping except for an inch at the end, and taking care to cut upwards and inwards. The previous employment of cocaine will diminish the pain of the incision and facilitate the operation. Occasionally the abscess may not be struck by the bistoury, but if a pair of Lister's sinus forceps are passed into the puncture and gently opened in one or two directions, the pus will generally be detected and freely escapes. If suppuration

has occurred in the peri-tonsillar tissue in front of the tonsil, the abscess will generally tend to point in the region of the supra-tonsillar fossa and it should be opened in this position (fig. 50.) Sometimes it is quite possible to pass the blunt ends of the sinus forceps into a tonsillar abscess without preliminary puncture by a bistoury. Poultices externally and the inhalation of steam will hasten suppuration. After the acute stage has passed, tonics, such as tincture of the perchloride of iron, quinine, acid and bark, are usually required. An acutely inflamed tonsil should not be removed unless it is giving rise to great difficulty of breathing.

19. CHRONIC ENLARGEMENT OF THE TONSILS.

Ætiology.—Nothing can be definitely said on this point except that there is a strong hereditary tendency to enlargement of the tonsils; by some authorities it is attributed to struma; not infrequently it seems to follow upon repeated slight attacks of tonsillitis. The zymotic diseases, especially scarlet fever, diphtheria and measles, exercise considerable influence in the production of this condition. Enlarged tonsils may be regarded as partly congenital, partly the product of preceding inflammation, and partly the result of a disproportionate growth of the tonsil in comparison with other glandular organs. The enlargement may date from infancy or develop during childhood or at puberty. As a rule the enlarged tonsils shrink in adult life, and this atrophy is completed much earlier in the female than in the male. Enlarged tonsils have been known

to disappear suddenly and completely after attacks of scarlet fever and diphtheria.

Morbid Anatomy and Pathology.—Three chief varieties of hypertrophied tonsils are met with:—
 1. Chronic lacunar tonsillitis in which the glands may be only slightly enlarged, but the crypts are filled with evil smelling plugs of a yellowish-grey colour consisting of epithelial and pus cells mixed with a variety of septic organisms and products of fatty degeneration. 2. The enlarged tonsil is hard, as a result of an excessive growth of the fibrous elements; this condition is said to be associated with the arthritic diathesis. 3. In this variety the tonsil is soft, and in it the growth of adenoid tissue is most marked; this form occurs in lymphatic children. The tonsils vary much in size and shape; they may be as large as chestnuts or even larger; they may project into the mouth so as to touch one another, or they may be flat and chiefly enlarged in the vertical direction. They may be smooth on the surface or have a sponge-like appearance, with the surface scarred by lacunar inflammation. In some cases the lacunæ are occupied by caseous masses; or concretions of a calcareous nature may form in the tonsils. In children and young adults it is very frequent to find the enlarged tonsils associated with adenoid growths in the naso-pharynx.

Symptoms.—In chronic lacunar tonsillitis the accumulation in the crypts may give rise to various sensations of discomfort in the throat, the breath is often foul, and patients complain of foul tasting “pellets” constantly appearing in the mouth. In the other forms of tonsillar hypertrophy, the child—for it is in children that the symptoms are most marked—breathes with the mouth open, and has consequently a vacant expression, which is increased if, as is often the case,

deafness be also present. The deafness is usually due to catarrhal thickening of the mucous membrane of the Eustachian tube. The breathing is laboured, and when asleep the child snores. Owing to the difficulty in breathing the chest is frequently pigeon-breasted; this is especially apt to be the case if the child be also rickety. The face is long, and the nose narrow and contracted. The mouth is generally open, and in consequence of breathing being carried on through it, there is much faucial irritation. The lips are swollen and the lower one everted. The voice is thick and guttural, and speaking soon tires the patient. Food is insufficiently masticated; swallowing is performed with difficulty and in a clumsy fashion. In some cases impairment of the senses of smell and of taste has been noted. As a rule there is some fulness of the neck about the angle of the jaw, and the cervical glands are almost invariably enlarged. The patient is generally ill-developed, delicate and listless, and he has an unhealthy aspect. Night terrors and screaming have been found associated with enlarged tonsils, and have disappeared after their removal. The tonsils may be the starting point for various reflex phenomena, *e.g.*, pains in the ear, cough, vomiting, and pains in the epigastrium, with or without cramp in the stomach.

Diphtheria readily attacks enlarged tonsils, and there is reason to believe that other septic poisons may find entrance into the system through erosions, &c., on the tonsils (*vide supra*).

Treatment.—The only satisfactory method of treating enlarged tonsils is to remove them, and the indications for the operation are the following: (1) Repeated attacks of tonsillitis; (2) Frequent blocking of the lacunæ with cheesy material, which rapidly decomposes,

and affords a culture medium for various pathogenic germs; (3) Inability to breathe sufficiently through the nose, with snoring during sleep; (4) Nasal voice and defective articulation; (5) Deafness and attacks of ear-ache; (6) Tendency to pigeon-breast.

In chronic lacunar tonsillitis it is best when possible to remove the tonsil substance itself, and where a guillotine is not applicable punch forceps (p. 303) may be used with good effect, or enucleation practised. In other cases the crypts can be cleaned out with a spud or small sharp spoon and their interior cauterised by strong chloride of zinc solution (gr. 40 ad ʒj.) or the galvano-cautery. The condition is troublesome, and one of the radical measures recommended is generally necessary to produce a lasting cure.

In advising the removal of the tonsils a good prognosis can only be given when adenoids are not present, unless these are removed at or about the same time as the tonsils, when freedom from all symptoms short of actual structural changes may be expected. With this proviso there is, in our experience, hardly any operation which yields more certain and satisfactory results than the removal of greatly enlarged tonsils, and all ideas as to possible injury of the voice, or interference with the sexual function, may be dismissed as groundless. In recommending the removal of tonsils, the surgeon should point out to the parents the risk children suffering from enlarged tonsils run, in the event of their being attacked by scarlet fever or diphtheria, and the liability which delicate children incur of suffering from tuberculous glands in the neck.

Precautions.—The risk of hæmorrhage in the operation of tonsillotomy is certainly a rare one, but the frequency of its occurrence is probably under-estimated,

because many cases are not recorded. Fatal cases are not unknown, and in one instance (a boy aged eight and a half years) this result was due to abnormal distribution of the internal carotid.

The hæmorrhage may be of arterial origin, either from the division of one or two large branches, or free oozing from a large number of small vessels; of venous origin from division of the plexus of veins lying below and outside the tonsil; or of capillary or general origin as in cases of hæmorrhagic diathesis. In other instances a fibrotic condition of the tonsils may delay the normal contraction of the divided vessel walls. It must be remembered that the blood supply of the tonsils is almost exclusively derived from the external carotid through the ascending pharyngeal artery, and the tonsillar branches of the facial. Lefferts lays stress on the ascending pharyngeal artery as being "one of the most, if not the most, prolific sources of severe bleeding after tonsillotomy." The hæmorrhage may be induced by eating solid food, or by undue exertion too soon after the operation.

Under the age of fifteen a dangerous hæmorrhage is not to be feared except in cases of hæmophilia. After twenty the liability to hæmorrhage is much increased. Therefore for patients under twenty, and still more for those under fifteen, the radical treatment by excision is to be strongly recommended in cases where the tonsil or tonsils project well beyond the arch of the palate. If the patient be over twenty and the case is one suitable for excision, most surgeons would make suitable preparations for dealing with hæmorrhage, and run the slight risk incurred by the operation. It is surprising how rarely it will be necessary to use the means for checking hæmorrhage if such precautions are taken. If, how-

ever, the patient or surgeon declines the slight risk thus involved, the tonsil can be reduced by three means:—

(a) Galvano-cautery. (b) Wire ecraseur. In three instances I (H. T.) have removed large tonsils in the adult with the cold wire loop of a strong polypus snare. If the loop is tightened up slowly there is practically no hæmorrhage. The pain of the process is, however, considerable. (c) “Morcellement” (*vide infra*). The plan of destroying the tonsil by the galvano-cautery is a tedious one, but, thanks to the introduction of cocaine, it is hardly painful. Three punctures may be made in each tonsil at one sitting, and as a rule eight or ten sittings are required, though in exceptional cases twelve to fifteen may be necessary. At first the punctures may be made freely, but as the tonsils shrink greater caution must be used. The sittings should take place at intervals of a week or ten days, unless excessive inflammatory reaction is set up in the tonsil. Between the applications a carbolised alkaline spray may be used (formula No. 52). Tonsillotomy should, if possible, be performed without an anæsthetic; occasionally, however, in very nervous children it may be necessary to give them “gas” or chloroform. The application of a 10 per cent. solution of eucaine to the throat undoubtedly facilitates the operation, by diminishing the sensibility of the part. In performing the operation it is advisable to have an assistant standing behind the patient, to steady the head and to make the tonsil more prominent in the throat by external pressure applied behind and below the angle of the jaw. If both tonsils are enlarged, the excision of the second should follow immediately upon the removal of the first, without giving the patient time to think about it. The best instrument for the removal of tonsils is undoubtedly Morell

Mackenzie's modification of Physick's guillotine (fig. 51). Some surgeons, however, prefer Fahnestock's guillotine; this is a more complicated instrument than Mackenzie's, and is liable to break, and the detached part may be swallowed. It is also very liable to get out of order and is difficult to keep aseptic. For the removal of enlarged tonsils in adults, Bosworth prefers a modifi-

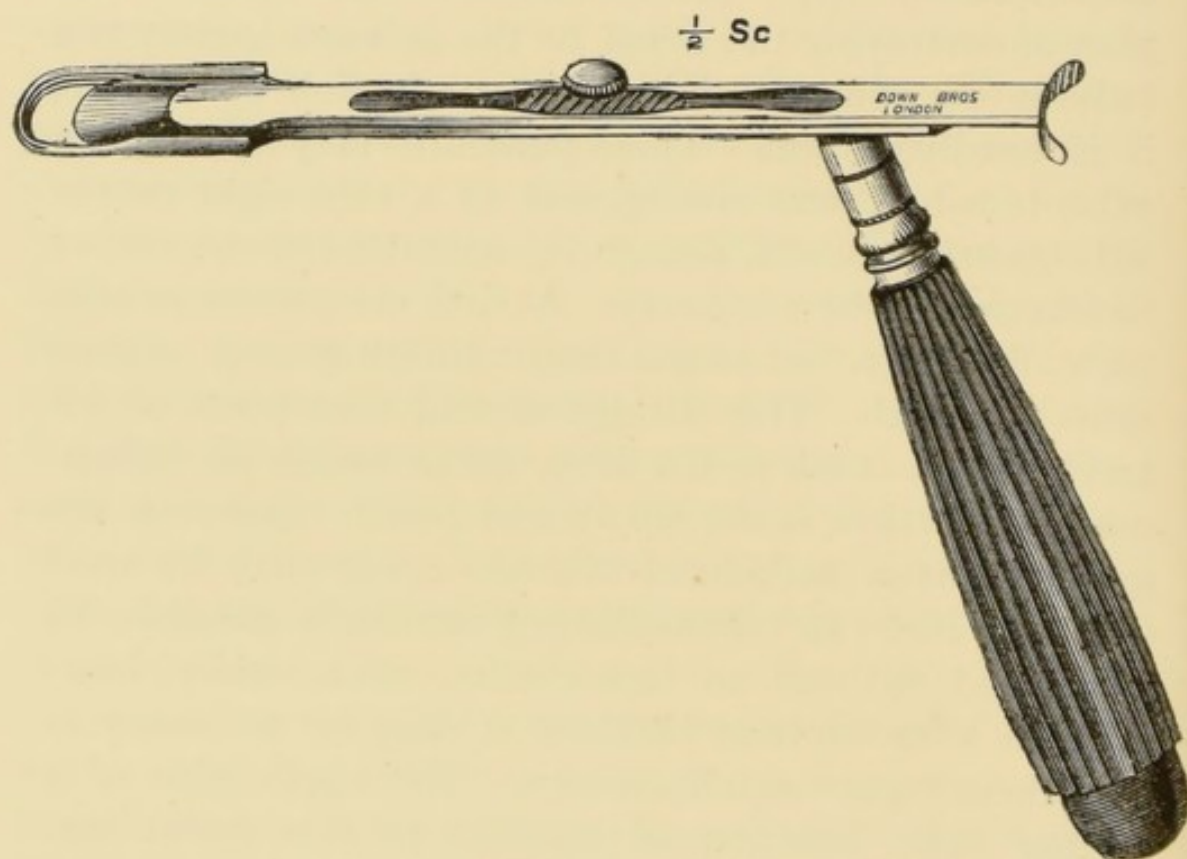


FIG. 51.—Mackenzie's Tonsillotome.

cation of the ordinary polypus snare. Some general surgeons still use a guarded bistoury for removal of the tonsils. This slow and painful method has nothing to recommend it, and most of the cases of severe hæmorrhage following tonsillotomy have occurred when this method of removal has been practised. Whatever instrument is used, great care must be taken not to incise the anterior pillar of the fauces, since a large twig of

the tonsillar artery runs in this fold of mucous membrane, and also because such an accident may produce injury to the voice. If the tonsil be adherent to the fold it must first be set free by a few touches of the scalpel.

The hæmorrhage which follows tonsillotomy seldom requires treatment; should it persist the patient may suck pellets of ice; if this is not sufficient Mackenzie recommended that he should slowly sip a mixture of tannic and gallic acids (formula No. 4). Failing this, the most efficacious plan of treatment is direct pressure. A pad of cotton-wool charged with some astringent, *e.g.*, styptic colloid or pure hazeline solution, and firmly fixed on a suitable holder, should be applied steadily to the bleeding point, and the patient should be kept in the erect position while counter pressure is applied externally behind the angle of the jaw, and retained for at least five minutes. On removal of the pad, if hæmorrhage has ceased the patient must remain quiet for three to four hours, and in the meantime suck small pellets of ice. For the next day or two only soft, cold food should be taken. When simpler measures do not suffice to check hæmorrhage it is generally because some small artery is divided, and an endeavour should be made to seize the bleeding point in a pair of tonsil artery forceps (Wells's forceps with long handles). A few minutes compression will as a rule effectually seal the mouth of the vessel, or it may even be possible to apply a ligature to the bleeding point. Amongst other methods which have been found successful, may be mentioned that of seizing the root of the tonsil with a pair of ordinary dressing-forceps and giving a twist to the instrument; or the loop of the cold wire snare may be applied, possibly with the aid of a transfixion needle, as

recommended by C. H. Knight. Often the bleeding ceases when the patient becomes faint. Should it persist in spite of treatment, and the patient be in danger of dying from loss of blood, it has been recommended that either the external or the common carotid should be tied. In a recent discussion at the Clinical Society, Harrison Cripps said that the external carotid should be tied between the superior thyroid and lingual arteries. Arbuthnot Lane in the case under consideration, tied the common carotid, having previously injected between three and four pints of salt solution. He maintained that if the salt solution be injected, cerebral trouble would not come on after ligation of the common carotid.

After tonsillotomy the wounded parts will be sore for some days, and the patient should be fed on soft food; the marsh-mallow lozenge will be found to have a soothing and demulcent effect. If there be recurrence of the tonsil after tonsillotomy, this is to be attributed to insufficient removal. Most surgeons advise that the tonsils should not be removed while they are in a condition of inflammation, and this sound advice should be followed, notwithstanding the assertion of those who maintain that they have seen no ill-effects from operating under such circumstances. If children with enlarged tonsils should unfortunately be attacked with diphtheria, the surgeon may be compelled to excise the tonsils, and though this should only be done under urgent necessity, the operation has had excellent results. It will often be the experience of the surgeon to meet with large flat tonsils, which project very slightly beyond the anterior pillars of the fauces, and extend downwards to the base of the tongue where they merge into the lingual tonsil. It is impossible to remove them with

the ordinary guillotine and three courses of treatment are open to the surgeon.

1. **Repeated Applications of the Galvano-Cautery.**—The disadvantages of this method have already been pointed out.

2. **Morcellement.**—By this means portions of the tonsil substance are punched out with a suitable instrument (fig. 52). The method is not more painful

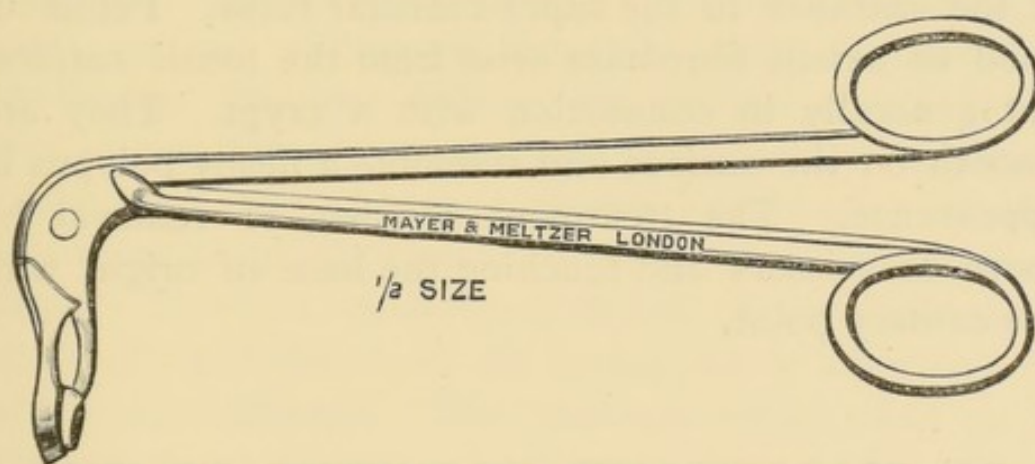


FIG. 52.—Tilley's Tonsil Forceps.

than the cautery and it is certainly more rapid and effectual in its results.

3 **Enucleation.**—This method gives the most rapid and best results. Under general anæsthesia the anterior pillar is dissected off the tonsil substance, the latter is then seized and steadied by vulsellum forceps, while the index-finger is inserted above the tonsil, which is peeled out from its bed from above downwards. The hæmorrhage may be free, but can be easily controlled by sponges on holders. The large cavity left after removal of the tonsil generally heals rapidly, and the result leaves nothing to be desired.

20. BENIGN TUMOURS OF THE TONSIL.

These are represented almost entirely by simple papillomata and fibromata. The former are epithelial outgrowths generally arising from the walls of a tonsil crypt, and are wart-like in microscopical structure. Similar papillomata sometimes spring from the margin of the entrance to the supra-tonsillar fossa. Pedunculated or sessile fibromata arise from the tonsil surface, but generally in connection with a crypt. They are smooth on the surface and resemble a fleshy polypus in appearance. The treatment consists of removal by snare or scissors and touching the base of origin with the cautery point.

21. MALIGNANT GROWTHS OF THE TONSILS.

It will be convenient and save repetition if we consider the malignant diseases of the tonsil under one heading.

The tonsil is subject both to sarcoma and carcinoma. According to Butlin the former is "the most common of the malignant tumours which affect the tonsil."

Of the sarcomata, lympho- or round celled sarcoma is the form which usually, if not always, attacks the tonsil, and of the carcinomata it is chiefly epithelioma.

In some cases of so-called primary sarcoma of the tonsil, it is a question whether the tumours are not portions of disseminated lympho-sarcoma, the first large tumours appearing in the tonsils. In recent years a large number of cases of malignant disease of the tonsils

have been reported, so that the opinion formerly held as to the comparative rarity of the disease is no longer tenable. Tonsillar cancer is almost exclusively met with in persons of middle life and upwards, and males are chiefly affected. Sarcoma, on the other hand, occurs in younger subjects, and has been met with in persons under twenty.

Symptoms.—At first the symptoms are ill-defined, and they may simulate those of simple hypertrophy. Later on the symptoms become more pronounced. Swallowing becomes difficult, the patient complains of pain in the throat, of neuralgic pains in the ear, back of the neck and pharynx, caused by pressure of the infiltrated lymphatic glands on the fibres of the cervical plexus. Pain on swallowing is one of the early symptoms of epithelioma of the tonsil, but a later one in sarcomatous disease. The tonsil is tender, and as it enlarges it gives rise to the sensation of a foreign body in the throat, the voice becomes "throaty," and there may be deafness.

Epithelioma attains the greatest size, next in size comes lympho-sarcoma, and scirrhus is usually the smallest. The increase in colour and consistence of the tonsil is most marked in epithelioma and least marked in lympho-sarcoma in which the mucous membrane has been described as red and succulent.

Epithelioma breaks down more rapidly than sarcoma, forming an excavated irregular cavity. Sarcoma may present itself as a smooth regular tumour and tends to spread externally. When ulceration takes place, the appearance of the tumour, the fœtor of the breath, and the hæmorrhage which frequently occurs, simplify the diagnosis.

Though as a rule in all forms of malignant disease of

the tonsil the lymphatic glands are affected at a very early period, nevertheless exceptional cases are met with; thus Newman records a case of encapsuled spindle-celled sarcoma of the left tonsil in which the lymphatic glands were not involved, and Dor records a case of epithelioma of the tonsil in which swelling of the glands was absent, so that at first the idea of a gumma was entertained. The glandular swelling comes on earliest and is most pronounced in encephaloid and epithelioma; in scirrhus it occurs late and is less developed. There is frequently pain on pressure at the angle of the jaw, and in advanced cases the cancerous cachexia is well marked.

Prognosis.—Death may take place partly from inability to take nourishment, and partly from constitutional contamination. In some cases the fatal termination is accelerated and occasionally even directly brought about by hæmorrhage. Butlin states that the disease proves fatal in very many instances within a year, or even six months of its first appearance; indeed, few persons survive, without treatment, more than three-quarters of a year. Epithelioma usually kills the quickest.

Diagnosis.—The diagnosis of sarcoma of the tonsil at an early stage is a matter of great difficulty. It may simulate a simple hypertrophy of the tonsil. An enlargement of one tonsil, gradually increasing in size, firm to the touch, should suggest the suspicion of sarcoma, especially in an adult, and when its growth is accompanied by a loss of body weight. In lympho-sarcomata an examination of the blood for excess of leucocytes might also assist the diagnosis. As contrasted with carcinoma it has but little tendency to ulcerate, though hæmorrhages from erosions are not

infrequent. Syphilitic affections of the tonsil are most likely to be confounded with malignant disease. I (F. de H. H.) have seen a case of chancre of the tonsil which was considered to be malignant until a secondary rash made its appearance. Again, a gumma in an old person may closely simulate malignant disease, and vice versa, the hardened edges and indurated base of a chronic ulcer of the tonsil should always excite suspicion of malignant disease, but a bad prognosis should not be positively given until the possibility of syphilitic disease has been excluded, and in all cases where there is any doubt, the patient should be put on a thorough anti-syphilitic course. It must, however, be borne in mind that full doses of iodide of potassium have sometimes a most remarkable effect in improving the condition of malignant ulceration.

In the absence of a clear history the irregular cavity left by the bursting of a tonsillar abscess in an old person may simulate malignant disease. Primary sarcoma of the tonsil may be mistaken for quinsy.

Treatment.—If the case is seen and diagnosed early, *i.e.*, before the glands are affected, the question of an operation will have to be considered. Newman and others have obtained excellent results by the early treatment of epithelioma of the tonsil by complete removal of the same, and hence the chances of cure are not so remote as was formerly considered to be the case. Sarcomata are sometimes more or less encapsulated, and if an incision is made into the capsule they may readily be shelled out with the finger or director. If a more radical procedure has to be adopted, the growth may be removed through the mouth by means of the benzine cautery, the galvano-caustic loop, or by the knife. The hæmorrhage which accompanies the

operation is sometimes not much more than is met with in cases of tonsillotomy. Some operators advise that the growth be removed externally, by pharyngotomy. This operation is adapted to cases where the glands are affected. Butlin* has fully described the methods and results of the various operations, and the reader is referred for details to his work. Should the case not admit of radical operative interference, tracheotomy may nevertheless be required to prevent death from suffocation, and gastrotomy where there is inability to swallow nourishment. A few encouraging reports have been received as to the value of Coley's fluid in the sarcomatous group of cases. If there be an ulcerated surface various antiseptic sprays and gargles may be ordered; of these the best are formulæ Nos. 51 and 52. Iodoform or iodol may be used as an insufflation if the ulcer be very foul. Painting the ulcerated surface with a 20 per cent. solution of cocaine, or the insufflation of orthoform, will facilitate deglutition. In the later stages, morphia, preferably in the form of the hypodermic injection, will almost certainly be required to assuage the intolerable pain. In those cases when the enlargement of the tonsils is only an instance of general glandular enlargement, as in Hodgkin's disease, great diminution in size may be sometimes brought about by large doses of arsenic.

22. CALCULI OF THE TONSILS.

The secretions are occasionally retained in the lacunæ of the tonsil, and becoming calcified give rise

* "The Operative Surgery of Malignant Disease," 2nd edit., p. 170. See also Newman, "Malignant Diseases of Nose and Throat," pp. 177-196, and *Lancet*, 1893, vol. i., pp. 591 and 1367.

to tonsillar calculi. A very common position for these growths is the supra-tonsillar fossa.

They vary in size from mere specks up to masses as big as a pigeon's egg and weighing an ounce (Robertson). They may be soft and crumbling or as hard as stone. Sometimes the surface which is embedded in the tonsil is smooth and the free surface rough and knobby, or the free surface may be polished as though by the passage of food, and the surface towards the tonsil be granular. It has been suggested that these calculi are identical with the tartar that forms about teeth.

Gruening states that all tonsillar concretions contain leptothrix elements, and that the presence of this parasite determines the precipitation of the lime in the form of a carbonate.

According to Mackenzie tonsillar calculi "consist principally of phosphate and carbonate of lime." Their composition varies, however, and in Robertson's case the calculus was mainly composed of phosphates of lime and magnesia, with only a small amount of carbonate.

Symptoms.—Occasionally the calculi give rise to no symptoms and are only accidentally discovered. In other instances their presence may cause prolonged suppuration with periodical attacks of acute or sub-acute inflammatory conditions, or severe pricking and stabbing pains in the faucial regions and ears. The sub-maxillary glands may enlarge as a result of the continued irritation, and the concretion may be expelled on the bursting of the abscess to which its presence has given rise. Sometimes more than one calculus is present in the same tonsil. The fact that they usually occur in the upper part of the tonsil and that in the supra-tonsillar fossa large caseous deposits can often be

found, would point to this region as a common source of origin. Their presence should always be suspected when a patient complains of chronic pain in a tonsil, which is enlarged and tender, and which is subject to periodical attacks of tonsillitis.

Treatment.—Tonsillar calculi, if small or soft, may easily be removed by the forceps, or with a scoop after painting the tonsil with cocaine; the large and hard calculi are best shelled out with the finger; it may sometimes be necessary to incise the margin of the tonsil surrounding the stone in order to liberate it, or to freely enlarge the opening into the supra-tonsillar fossa. The danger of leaving a large calculus *in situ* is that if, during an acute attack of acute tonsillitis, the tonsillo-lith should escape from its abscess cavity during sleep, it may fall into the larynx and asphyxiate the patient. Such an accident nearly occurred in Robertson's patient. After the removal of the concretion, the cavity which contained it should be cauterised with the glavano-cautery or some caustic, in order to get it to close. If, as is frequently the case, the tonsil be hypertrophied, recurrence of the stone formation is effectually prevented by excision of the tonsil.

23. HYPERTROPHY OF LINGUAL TONSIL.

The term "lingual tonsil" has been applied to the lymphoid tissue at the base of the tongue.

Ætiology.—The causes of enlargement of the lingual tonsil are those which give rise to repeated slight hyperæmia of the part, *e.g.*, spices, pickles, and other irritating articles of diet, alcohol, too hot or too

cold drinks, especially if the one rapidly alternates with the other. Diathetic diseases, such as rheumatism and gout, are said to cause enlargement of the lingual tonsil. It occurs more frequently in women than in men, or at all events women more often complain of symptoms referable to this condition. Adults are more commonly affected than children, unlike what takes place in the case of the faucial tonsils. Baber has, however, described a case in which hypertrophy of this tissue in a child induced such difficulty of breathing as to imperil life.

Morbid Anatomy and Pathology.—There is a simple increase of the lymphoid tissue of the part, which contains numerous mucous and albuminous glands. In well-pronounced cases the sulcus, which normally exists between the root of the tongue and the epiglottis, may be almost completely obliterated. This hypertrophy may be uni- or bilateral.

Lennox Browne has directed attention to a varicose condition of the veins at the base of the tongue, which may occur alone or in association with the lymphoid overgrowth, and regards them, like enlargement of the lingual tonsil, as a cause of some of the paræsthesiæ met with in the pharynx (*vide infra*). The lingual tonsil forms part of a tract of lymphoid tissue known as Waldeyer's ring, the rest of which is completed by the faucial, tubal and pharyngeal masses, and like these structures it is liable to acute and chronic inflammatory processes which arise, in most part, from similar causes. Thus an acute superficial, lacunar, or parenchymatous inflammation may occur, and in the latter instance suppuration may result. Chronic hypertrophy is most frequently met with in practice.

Symptoms.—In the milder form of acute inflam-

mation the symptoms do not materially differ from those met with when the faucial tonsils are at fault. In acute suppuration, however, there is pain especially on swallowing, or moving the tongue and the inflammation may spread downwards towards the larynx or forwards into the base of the tongue, while the constitutional symptoms and fever are severe. If the swelling fluctuates, and still more so if breathing is hampered by it, the abscess should be opened by means of a suitably curved knife. In chronic enlargement the symptoms consist of various paræsthesiæ and hyperæsthesiæ. Patients frequently complain of fullness in the throat with the sensation of a foreign body; hence it is possible that in some of the cases of "globus hystericus" there may really be something objective to explain the symptoms. Tickling in the throat, inducing a constant desire to swallow, an irritable cough, and fatigue in speaking or singing are not infrequently observed. Dysphagia is rare. Boylan relates a case in which dyspnœa was a prominent symptom; the swelling in this case was so great that the epiglottis was quite invisible, and nothing could be seen of the larynx except the tips of the arytenoids. In a case, reported by Thrasher, there was indistinctness of speech and choking on deglutition. In some cases the tip of the epiglottis gets caught in the hypertrophied tissues, and fits of coughing and laryngeal spasm are produced; setting free the epiglottis by means of the laryngeal probe will usually give temporary relief in these cases, but a permanent cure is only to be effected by reducing the size of the lingual tonsil.

Diagnosis.—The recognition of enlargement of the lingual tonsil is readily effected by means of the laryn-

goscope. Under normal conditions there is a distinct interval between the anterior surface of the epiglottis and the root of the tongue; if this space be filled up with a soft irregular growth, of a lymphoid nature, hypertrophy of the lingual tonsil may be diagnosed.

Prognosis.—More than one case has been recorded in which the growth was so great as to cause dyspnœa, but this is quite exceptional. In the vast majority of cases, apart from the local discomfort produced by the enlargement, the condition is quite harmless, though it is conceivable that the constant cough, which is sometimes a symptom, may give rise to emphysema of the lungs.

Treatment.—In cases of slight enlargement, the daily application of preparations of iodine (formula No. 45) may be tried, but where there is marked hypertrophy, nothing equals the destruction of the growth by means of the galvano-cautery. If the part be previously painted with a twenty per cent. solution of cocaine, but little discomfort will be experienced. If the hypertrophy be very great it may be necessary to use the galvano-caustic loop, or better a suitably curved guillotine. Bosworth prefers his nasal polypus snare, "the tube of which, being of flexible metal, can easily be bent to the proper curve, viz., to about the sixth of a circle." Any defects in the general health should be attended to, and if there be constipation or symptoms of nervous erethism, bromide of potassium, or the asafœtida and zinc pill (formula No. 46) will accelerate the cure. Sajous has found the administration of small doses of mercury combined with iodide of potassium gives excellent results, even when a specific history is absent. In this matter McBride's note of warning should always be borne in

mind: "It is only when the neurotic state, which leads to the production of symptoms, has been remedied or has been proved irremediable, that the use of the electric cautery is justified in cases where the hyperplasia is of small extent."

24. LINGUAL VARIX, OR "VARICOSE VEINS AT THE BASE OF THE TONGUE."

If, in a large series of healthy or unhealthy individuals, the base of the tongue situated in front of the epiglottis be examined laryngoscopically, it will be noted that a number of small superficial veins can nearly always be seen coursing over the lingual surface from above downwards.

In exceptional instances these veins show here and there little nodular thickenings, and still more rarely do these little dilatations reach the size of a hemp seed or possibly a little larger.

To such conditions as these Lennox Browne has applied the term "lingual varix" or "varicose veins at the base of the tongue," and he regards them as an evidence of general vaso-motor debility, while to their presence alone, or in association with hypertrophy of the lingual tonsil, has been ascribed a collection of most diverse and extraordinary symptoms ranging from such paræsthesiæ as "tickling or fulness in the throat" to "spasmodic torticollis" and (according to one writer) "paresis of an upper limb." One of us (H. T.) has recorded a case of functional aphonia which was said to be due to this condition.

Such a relationship of cause and effect is one from which we dissent, and we have good reason for be-

lieving that in this matter we are in agreement with the great majority of British and Continental laryngologists. (The opinion of many members of the profession most qualified to judge on this question will be found in the *Lancet* from February 15 to March 28, 1896).

We do not for a moment deny, that a fulness of these vessels sometimes exists, and that they may occasionally merit the title "varicose," nor are we prepared to maintain that very occasionally a leakage from such vessels may not simulate hæmoptysis, nor when associated with lymphoid overgrowth in this situation they may not produce feelings of fulness and so forth; but we do hold that such symptoms arising from such a cause are exceedingly rare and that a condition of the venous supply at the base of the tongue which is quite within physiological limits has only too often been regarded as pathological, and this, in our experience, when the cause of the patients symptoms is not otherwise obvious.

When we bear in mind that in the opinion of the partisans of the varicose vein theory, the appropriate remedy is the application of the galvano-cautery to the base of the tongue, we shall do well both for our own and our patients' sake to remember McBride's words of caution, (in the controversy already referred to) viz., "If we are to cauterize every venous radicle which appears in front of the epiglottis, we shall put our patients to much needless inconvenience and perhaps to some very unnecessary expense."

25. DISEASES OF THE UVULA.

From its position the uvula naturally suffers when the soft palate and fauces are affected; hence it is liable

to inflammation, and to be the seat of the local manifestations of measles, scarlet fever, diphtheria, syphilis, &c. A case has been recorded in which, as the result of diphtheria, the uvula was destroyed by sloughing. Occasionally the uvula, instead of being affected by extension from the soft palate, is the starting point of the inflammation, and very rarely the mischief is limited to the uvula, the term uvulitis being applied to this condition. Cold seems to be the most common cause of uvulitis. In some cases the engorgement of the uvula may proceed to such a degree, that it may attain the size of the thumb, or even form a sausage-shaped tumour concealing the arches of the palate and the tonsils. Suffocative attacks have been known to occur in cases of great œdema of the uvula, and an irritating cough is usually present, even when there is only moderate enlargement.

Treatment.—When the uvula is acutely inflamed, the application of a 20 per cent. solution of cocaine, by the spray or laryngeal brush, will often suffice to give relief, and pellets of ice in the mouth will assist. Such treatment should be accompanied by appropriate treatment of any constitutional dyscrasia which may predispose to the local inflammation. Should these measures fail, astringent applications such as the glycerine of tannin or the glycerine of alum may be employed. In severe cases puncture or scarification will be required, and even amputation of the uvula may be necessary, if scarification fails to give relief, and there are suffocative attacks.

Elongation of Uvula.

By repeated inflammatory attacks, particularly in persons of lax fibre, the uvula may become permanently

elongated. In one instance the uvula was so long that the patient could take it between his teeth; on removal, it was found to be four inches in length, its lower extremity terminating in a knob. An elongated uvula frequently gives rise to an irritating cough, especially when the patient is in the recumbent position; this fact should be borne in mind in investigating cases of nocturnal coughing. It may also produce the sensation of a foreign body in the throat, or cause an inclination to vomit. Singers and voice users commonly ascribe any vocal defect to the uvula, but very often the trouble is due to a general relaxation of the soft palate in which the uvula takes part. Schech states that elongation of the uvula may produce spasm of the glottis, especially in alcoholic subjects, and Mantle has described a case of laryngismus in a child cured by removal of the uvula.

Treatment.—In the first place it is necessary to improve the general health, and to remember that removal of the uvula is not often necessary. If there be constipation, a mixture containing the sulphates of iron and magnesium (formula No. 20) will usually diminish the relaxed condition of the uvula. Then astringents locally may be tried. A combination of the extract of krameria and cocaine made up into a pastille is often very effectual. Or astringent gargles, such as alum or tannic acid may be ordered. The application of nitrate of silver fused on an aluminium probe usually gives, at all events, temporary relief. Should these measures fail, the elongated organ must be amputated.

Though many appliances have been devised for the amputation of the uvula, this is best effected by seizing the tip of the uvula with a pair of forceps (mouse-toothed forceps answer well) held in the left hand,

while the end of the uvula is cut off with ordinary curved scissors or special uvula scissors fig. 53. Care should be taken not to exert too much traction on the uvula, otherwise the mucous membrane is drawn down and cut off, leaving a raw stump which is slow to heal. It is not desirable to remove the organ level with the palate, but to remove only the redundant portion. Bosworth estimates the normal length of the uvula in the adult at about three-eighths of an inch. The removal of the uvula is much facilitated by previously painting it and the soft palate with a 10 per cent. solution of cocaine; in doing this the action of this



FIG. 53.

drug in causing contraction of mucous membranes must be remembered.

The galvano-caustic loop may be employed for removing the uvula, if there be fear of hæmorrhage or the patient object to a cutting instrument. The indications for uvulotomy as laid down by Semon are as follows: (1) "Elongation to such a degree that the uvula, especially during sleep, is sucked into the larynx and produces attacks of suffocation; (2) The co-existence of a long, thick uvula, with a persistent feeling of irritation in the throat, and a constant tickling cough; but it must be distinctly understood that this indication is valid only after careful examination of the pharynx, larynx, and thorax, and after exclusion of all other possible causes; (3) The hindrance offered by a very long uvula to the

performance of delicate endolaryngeal operations; (4) Malignant disease starting from the uvula." There can be no doubt that the uvula is frequently removed unnecessarily, as the reasons for its removal are but rarely met with. It should be borne in mind that the pain on swallowing, which sometimes follows the operation, is severe and persistent, and occasionally the hæmorrhage is excessive. In one or two cases the hæmorrhage, which was very trifling at the time of the operation, recurred with great violence some hours later. The most effectual way to arrest the hæmorrhage is to sip slowly a mixture of tannic and gallic acids (formula No. 4) as recommended by Mackenzie, and failing this by seizing the stump in forceps or clamp, or by applying the cautery to the bleeding point.

Malformations of the Uvula.

The uvula may be cleft, giving rise to a bifid condition; or there may be two uvulas, and these may be situated side by side, or one may be in front of the other.

Apparent absence of the uvula is generally to be accounted for by destruction of this body through tertiary syphilitic or lupoid ulceration.

Growths of the Uvula.

Mucous polypus, papilloma, cavernous angioma, epithelioma, &c., have been recorded as taking their origin from the uvula.

The benign growths may be snipped off with scissors or removed with the galvano-caustic loop. In the case of malignant disease of the uvula, it is desirable not only to remove the growth, but also the greater part of

the uvula itself, so as to make certain that the incision is made through healthy tissues. The removal of the diseased uvula is effected in the same manner as for simple enlargement.

Paralysis of the uvula is often observed as a result of diphtheria.

26. DIPHTHERIA.

By diphtheria we understand an acute infectious disease, which primarily and preferentially attacks the mucous surfaces of the upper respiratory and alimentary tracts, where its presence is nearly always manifested by an inflammatory process, which is characterised by the formation of a membranous deposit. Such local morbid changes, and the general symptoms which result therefrom, are due to the presence and growth of a specific micro-organism, the Klebs-Loeffler bacillus diphtheriæ.

As we are here concerned more particularly with the manifestations of diphtheria as it concerns the upper air-passages, we shall only deal briefly with the general aspect of the disease—for fuller details of which the reader is referred to one of the standard textbooks of medicine.

Ætiology.—Although the Klebs-Loeffler bacillus is universally agreed to be the specific cause of diphtheria, there is some doubt as to the various conditions which dispose the individual to its action. As regards the question of *age*, statistics show that the greatest proportion of deaths from diphtheria takes place between the years of three and fifteen, but that the greatest incidence is experienced between the ages of two and five years. This question of age will have to be referred to

again in speaking of school life. At all ages the female *sex* is more liable to the disease than the male. In school children this is to be explained by girls kissing each other, and by their being generally more thrown into contact than boys. In women the danger of infection is usually greater than in men, as on the former falls the responsibility of nursing, and even if not actually engaged in looking after the sick, they are more confined to the house than their male relatives. The risk of infection by nurses is much intensified if they fondle, kiss, or carry their patients about. Downes is inclined to think that over and above these considerations there is also some physiological proclivity amongst females to take the disease, beyond that which attaches to males. There is a distinct *family predisposition* for the disease; this is generally due to the fact that the tonsils and the adenoid tissue of the nasopharynx are enlarged in several members of the same family, and this affords an easy mode of entrance to the virus. *Occupation* exercises a considerable influence, certainly as regards two classes—nurses, to whom reference has already been made, and the medical profession.

Recent investigations have conclusively proved that one of the most potent factors in the diffusion of diphtheria is *aggregation*, and this is especially the case when the crowding together occurs just at the very period of life when the incidence of diphtheria is the greatest, *i.e.*, at the school age, three to fifteen. Under such circumstances, unhealthy throats are very common and form an excellent medium for the growth and development of the diphtheria bacillus. Doubtless many an epidemic has been started by children returning to school while they were still in an infectious state, a condition

which may last for some weeks after apparent recovery if we are to regard as infectious, a patient in whom the Klebs-Loeffler bacillus can be found in the secretions from the mouth and throat.

Diphtheria has been spread by persons visiting the bodies of those who have died of the disease. Not only the body but also the house, and especially the room in which the patient lived during his illness, are to be regarded as infective, and the infection is preserved indefinitely in clothing, bedding, and the like. The poison is, however, only diffusible in the air to a very limited extent.

Locality.—Of late years there has been a curious change in the incidence of the disease.

Formerly it was twice as common in country districts as in towns; now there is an increase in the prevalence of diphtheria in the more dense communities, as compared with the less dense. A damp bleak locality, with conditions favouring vegetable decomposition, affords the most suitable soil for diphtheria. There seems also to be some kind of relationship between diphtheria and variations in the level of the subsoil water. Damp cellars and general dampness of houses favour the propagation of diphtheria.

The *influence of season* is shown by the circumstance that there is a marked rise in diphtheria mortality in October and nearly as much in November, but after December it begins to return to the average, though the death-rate in January is swollen by the cases originating in the previous month.

There is no evidence to show that the prevalence of diphtheria can be attributed to *polluted water*. It is more difficult to speak of the influence of *sewerage and drainage*. The extension of late years of diphtheria in

well-drained towns, which has corresponded with a marked diminution in the general death-rate, including that from typhoid fever, is a matter which requires much thought. Sanitary defects, by impairing the general health and leading to sore throats, prepare a suitable soil for the implantation of the diphtheria organism.

It is well recognised that *milk* has often conveyed the infection. It most frequently arises from diseased udders and teats ("chapped teats") of the cow herself, but in other cases by contamination from those who work in the dairies while in an infectious state. Klein has further shown that the true diphtheria bacillus has the property of multiplying in milk at the ordinary temperature of the air, hence the danger of storing milk or setting it aside for cream to collect, and the wisdom of exposing milk for five minutes to a temperature of 140° F., which destroys the vitality of the specific bacillus.

Other *animals*, such as cats and poultry, may be the vehicles for conveying diphtheria to man.

As regards its relation to *other diseases*, any affection of the throat, and especially scarlet fever, may produce a state of affairs which is favourable for the growth and development of the diphtheria bacillus.

Morbid Anatomy and Pathology.—The Klebs-Loeffler diphtheria bacilli vary in length, but the average is much the same as the tubercle bacillus. Two forms are commonly met with, viz., the long and short. The former somewhat resemble the letter *f*, and present a distinct club-like form. They easily stain by Gram's method or aniline dyes. Kanthack has pointed out that the bacilli never form chains or threads but are grouped in irregular clusters, like Chinese charac-

ters, which are built up of lines set up unsymmetrically and at various angles.

Now although the Klebs-Loeffler bacillus is present in every case of true diphtheria, it must be borne in mind that other organisms are generally present also, and these may so resemble the specific bacillus that, excepting they are non-virulent, it is difficult to distinguish them from the true bacillus and hence they are known as "pseudo-diphtheria bacilli." They may be found in the healthy and in non-diphtheritic throats. In addition to these, various forms of "cocci" are often found, including staphylococci, streptococci, &c. With such a mixed infection the clinical features of the case are sometimes possibly altered, and many of the so-called septic complications may occur, but Kanthack differed from many others in doubting whether the presence of the pyogenetic organisms necessarily meant a bad prognosis.

As already stated, the mucous surfaces of the upper respiratory and alimentary tract are usually attacked, but other parts of the body, such as the nasal and conjunctival mucous membranes, the labia, a blistered surface, a patch of eczema, &c., are occasionally the primary seats of invasion. Some abrasion of the epithelium is necessary in order to admit the virus. At its onset diphtheria is a local disease, and the constitutional effects are due to the absorption of toxic materials (a nucleo-albumen (Kanthack) and an organic acid) secreted by the bacilli during their growth. It has been shewn that some of the bacilli are actually absorbed into the system, *e.g.*, lungs and spleen, where they may continue their growth and secretion of poisonous material. As regards the membranous deposit so characteristic of this disease, it may be said to consist

of "filaments of fibrin which form a network enclosing in its meshes leucocytes, red corpuscles and bacteria." When it is detached a bleeding surface is often produced, which quickly becomes covered with a fresh membrane. The specific bacillus may often be found in any part of the membrane and nearly always in the younger or deeper layers, while cocci tend to accumulate in the outer or older portion of the deposit.

Associated with the changes in the pharynx is found enlargement of the cervical and sub-maxillary glands, with hæmorrhages and areas of necrobiosis. Later on similar, but less intense changes, may be seen in other lymphatic glands, the spleen, and the intestines. In the lungs evidences of an inflammatory infective process and of mechanical obstruction of the air-passages are to be found, and the specific micro-organism has been detected in these organs. The heart is generally affected late in the disease, often when the pharynx has become quite free from false membrane. The nature of the change is one of fatty degeneration brought about by the action of the diphtherial toxin. The kidneys may be found quite normal, even when albuminuria has been present, or there may be signs of parenchymatous inflammation. The albuminuria occurring during the course of diphtheria may depend on cardiac failure, obstruction in the lungs, pyrexia, as well as on the direct effect of the poison upon the kidneys.

The paralyses following diphtheria are well known complications and are often of serious import. They depend on a parenchymatous degeneration of the peripheral nerves, sensory, motor and sympathetic. Only certain fibres may be affected and hence the paralysis of a muscle may be incomplete; the muscle fibres, which correspond to the nerve fibres involved, them-

selves undergo atrophy and degeneration. These nerve degenerations are also due to the action of the diphtherial toxin.

Symptoms.—According to the report of the Clinical Society's Committee the period of incubation is most commonly two days; it is not infrequently three or four days, and it is sometimes extended to six or seven. The mode of onset of diphtheria varies very much. The most characteristic is that in which, after one or two days of indefinite malaise, the deposit appears upon the tonsils, pillars of the fauces, or the soft palate. Occasionally the disease comes on quite suddenly, the exudation on the fauces being the earliest symptom, or the disease may attack the larynx in the first instance, thus constituting primary laryngeal diphtheria. The disease sometimes begins in the nose, and then constitutes nasal diphtheria. In the insidious variety there may be chilliness, fever, enlargement of the sub-maxillary and parotid glands, followed after some days by exudation on the fauces. In malignant diphtheria the patient is at once struck down as though by a powerful poison.

The usual course of the disease in a case of moderate severity is as follows:—After one or two days of lassitude, malaise, and pains in the limbs, the patient complains of sore throat and slight pain or difficulty in swallowing; the acute and spontaneous pain, which is so frequent a symptom of tonsillitis, is generally absent in diphtheria. In some cases there may be little or no pain, and the disease is only recognised by discovering on the tonsils the characteristic yellowish-white or grey patches, which are preceded by hyperæmia of the mucous membrane. Extension of the exudation to the soft palate and uvula is pathognomonic of diphtheria as contrasted with lacunar tonsillitis. The glands at the

angle of the jaw are enlarged. The pulse is increased in frequency, there is moderate pyrexia though the temperature occasionally ranges high; in other cases a normal or even sub-normal temperature is seen for the first day or so; these cases often turn out unfavourably. In the course of a day or two the spots coalesce, and the membrane may spread in various directions; if to the larynx, causing hoarseness and dyspnœa; if to the nose, giving rise to an ichorous discharge; or up the Eustachian tube to the ear. A very rapid extension generally means a virulent attack. The membrane may or may not be easily detached from the underlying surface which appears almost normal or bleeding respectively. When the disease is due to a mixed infection the membrane is more swollen and tends to decompose, while a puriform discharge is often present. The breath becomes offensive, the glands at the angle of the jaw become more enlarged and tender. As a rule the mind is clear, but delirium may occur, and it may even be of a maniacal character. In cases going on to a fatal termination, symptoms of a typhoid nature now make their appearance. The tongue becomes dry and tremulous, the pulse very rapid and feeble, or infrequent, and the patient dies of syncope, or some pulmonary complication such as œdema or bronchopneumonia.

Albuminuria is a pretty constant feature of the disease; as its occurrence is often quite transitory, the urine must be tested regularly in order that the albumin be not overlooked. Unlike the albuminuria of scarlet fever it occurs at the commencement of the disease, and rarely lasts for long, even if it has been well marked. Anasarca is rare, and chronic nephritis is an uncommon sequel.

Rashes of an erythematous or roseolous type are occasionally seen in cases of diphtheria.

In the primary laryngeal form the earliest symptoms are those indicative of laryngeal obstruction, the croup of older authors. When the larynx is affected by extension from the pharynx, hoarseness and cough are noticed, and after a time there may be laryngeal stridor and dyspnœa, the latter being almost constantly associated with implication of the larynx in children. When diphtheria affects the larynx by extension from the pharynx, this usually occurs from three to six days after the commencement of the disease.

During an epidemic of diphtheria the occurrence of frequent small hæmorrhages, or discharge of mucus mixed with blood from the nostrils of a child, should raise the suspicion of nasal diphtheria, especially if there be any cervical glandular swelling. If the diphtheritic membrane be limited, as it not infrequently is, to the naso-pharynx, the diagnosis especially in the case of young children, is exceedingly difficult.

Diphtheria may kill from heart failure, at the very outset, if a large dose of the poison be absorbed. In the laryngeal form death is due to the mechanical obstruction to the entrance of air, or to the extension of the disease into the bronchi with collapse of lobules of the lungs. Septicæmia is not uncommonly a cause of death, especially in the nasal variety. Hæmorrhage is only rarely fatal; it may result from sloughing extending into one of the branches of the external carotid, or even into the internal carotid. Bleeding may also occur from the nose, which even if not directly fatal may so weaken the patient as to constitute a serious element in the case. Death may be brought about by vomiting, due to neuritis of the vagus or to uræmia.

Finally, during convalescence death may take place suddenly from syncope or from paralysis of the diaphragm.

Sequelæ.—Unlike the nephritis of scarlet fever, which is so frequently followed by chronic renal disease, the nephritis of diphtheria usually clears up as the acute stage passes by; in very exceptional cases, however, a chronic nephritis has been noticed as a consequence of diphtheria.

The important sequela of diphtheria is paralysis. This usually manifests itself during the period of convalescence, *i.e.*, about two or three weeks from the commencement of the attack, and not infrequently it comes on after attacks which have been so slight as almost to have escaped notice. The soft palate is commonly the part first attacked, the paralysis being evinced by the nasal twang of the voice and the regurgitation of fluids through the nose. Then there may follow signs of paralysis in any part of the body, *viz.*, numbness of the fingers and feet, loss of power in the extremities, especially the legs. Loss of knee-jerk is an early phenomenon, and often persists after all other signs of paralysis have disappeared. The disappearance of the reflexes is almost invariably preceded by a period of excessive response, lasting several days. There may be paralysis of the ciliary muscle, with consequent loss of the power of accommodation; the ocular muscles may be paralysed, causing diplopia and strabismus; if the laryngeal muscles be affected, difficulty of breathing and loss of voice may result; paralysis of the intercostal muscles and diaphragm are evidenced by dyspnœa and inability to expel bronchial mucus; while if the heart be affected sudden death may occur from syncope. The occurrence of dyspnœa, vomit-

ing and abdominal pain, in connection with the heart failure, suggest that the pneumogastric is the nerve implicated. In rare cases paralysis may be limited to the soft palate for a time, then sudden dyspnœa, slowly followed by acceleration of the heart and cyanosis, may come on, and death take place within an hour. In exceptional cases nearly the whole of the muscular system is implicated, so that the patient lies absolutely unable to effect any movement. There may be anæsthesia of the laryngeal mucous membrane, so that liquids enter the larynx and tend to set up pneumonia. Cutaneous anæsthesia is occasionally present and may be of limited or more general distribution. There may be impairment or loss of the senses of taste and smell.

Diagnosis.—The disease with which diphtheria is most frequently confounded is lacunar tonsillitis. At the outset it is best to state frankly that, from a purely clinical point of view, the differential diagnosis between these diseases is at times quite impossible; the transitional forms elude the diagnostic acumen of the ablest physician, but such difficulties are greatly minimised by a bacteriological investigation which enable us to distinguish the specific bacillus of diphtheria. It may be that in a given case, the attack really was one of lacunar tonsillitis at the commencement, and that the diphtheritic condition was secondary. There is a marked contrast between a typical case of lacunar tonsillitis, having a sudden onset with high temperature, and the lacunæ on the surface of the tonsil being blocked with a soft easily removable exudation, and the more gradual onset of diphtheria, with its membranous deposit of a yellowish-white or grey colour, which, even if at first occurring in spots, soon becomes confluent, and may

spread from the tonsil to the soft palate and uvula. Moreover, on attempting to remove the membrane a bleeding surface is left. The presence of albumen in the urine is in favour of diphtheria, and that is all that can be said about it, as diphtheria may occur without albuminuria, and on the other hand tonsillitis may be accompanied by it.

Mycosis of the pharynx and pharyngo-keratosis may occasionally be confounded with diphtheria; their characteristic features have already been referred to.

The throat ulceration of scarlet fever occurs in the early stage of the disease, and the distinctive rash is generally present; the ulceration is micrococcal in origin but may closely simulate a diphtheritic membrane. Mucous patches on the soft palate due to secondary syphilis, and the later manifestations of inherited syphilis, may deceive the unwary.

Prognosis.—One of the most important elements in the prognosis of diphtheria is the prevailing character of the epidemic, which may be mild or virulent. The effect of age is shown by the fact that the greatest number of deaths occur between two and three years. The existence of enlarged tonsils and of adenoid vegetations greatly increases the risk, as does also an unhealthy environment. The mode of onset gives some indication as to prognosis—*i.e.*, if the disease be ushered in with rigors, vomiting and great depression, after a short stage of incubation, it must be regarded as unfavourable. A thick and extensive deposit of membrane, which spreads over the soft palate and pharynx, is of unfavourable omen, as is also great swelling of the sub-maxillary glands, more especially if both sides be affected. Diphtheria primarily attacking the nasal fossæ usually runs a severe course,

and profuse epistaxis is a symptom of evil omen; laryngeal diphtheria is naturally a grave form. A sub-normal temperature during the early stage of the disease, especially if accompanied with weak action of the heart, is of unfavourable augury. According to Gee "Repeated vomiting is a very unfavourable prognostic sign in diphtheria." In connection with vomiting must be mentioned partial suppression of urine; the decrease in amount may be due to vomiting, or the latter may be of uræmic origin. When death occurs in these cases, vomiting begins about twenty-four hours before death, and there is great diminution in the amount of urine, only a few drachms being secreted. In the fatal cases there is a steady fall in the frequency of the pulse, followed by a rapid acceleration, extreme irregularity, and death. The presence of albuminuria is so common a feature of the disease, that it is of no prognostic significance, nor is there any very close connection between the amount of albumen and the gravity of the attack. Cardiac failure is indicated by a weak, frequent and irregular pulse, the latter being of especially bad omen. The patient becomes very pale and prostrate and the temperature of the body is often sub-normal.

The outlook of paralysis occurring after mild cases of diphtheria is good, but the risk to life is much greater if paralysis follows a severe attack.

The condition of the knee-jerk is of importance from a prognostic point of view, because so long as the knee-jerk is absent, the patient cannot be considered free from the risks of paralysis and cardiac failure. It must be borne in mind that in some cases of paralysis recovery is very tedious, and it may be many months

before the patient is restored to perfect health. Bristowe has never known a case of diphtheritic paralysis in which (if the patient did not die of it) ultimate recovery was not attained. One attack of diphtheria gives temporary immunity, but if the throat be left sore and irritable the patient may be predisposed to fresh infection. According to Eustace Smith second attacks are not uncommon, and they are usually more severe than the first. Diphtheria occurring during the course of the exanthemata, especially measles, is very fatal.

Treatment.—In accordance with the views already expressed as to the nature of diphtheria, the treatment of the disease resolves itself into:—1. Local measures which aim at preventing the extension of the disease by attacking the specific bacilli at the seat of infection, and thus diminishing the formation of the toxin produced in their growth. 2. Constitutional means calculated to neutralise the diphtheritic poison which may have been absorbed, and to maintain the general health of the patient. 3. The measures to be taken to prevent the spread of the disease.

1. *Local treatment.*—Every four hours the throat should be insufflated with sulphur, or sprayed with a mixture of equal parts of sulphurous acid and water. In the intervals the patient should frequently wash out the mouth with the borax and boric acid solution (formula No. 76) or with a solution of chlorine (formula No. 77). The mouth should always be washed before food is taken. In the case of young children the mouth should be sprayed with the same solutions.

If the disease has extended into the naso-pharynx and nares, solutions (Nos. 50, 51, 52) should be sprayed or syringed up the nostril. A very convenient

plan is to attach a No. 10 gum elastic catheter to a Higginson's syringe, by this means the nostrils and throat may be thoroughly irrigated, a basin being placed under the mouth; this procedure is especially useful for children. When the tonsils are enlarged, and still more so when they hamper breathing, it may be advisable to excise them, as in this way a large absorbent and unhealthy surface is removed.

2. The introduction of the diphtheria anti-toxic serum has completely revolutionised the treatment of this disease, and has greatly diminished its mortality; according to Goodall, in hospital cases by nearly one-half. This reduction is especially noticeable in patients under five years of age, and in the laryngeal cases. The earlier the injection is made, the smaller is the dose of serum required, and the greater is its effect.

The best place to inject the serum is under the skin of the abdomen. The spot selected should be washed with soap and water and then with a 1 in 20 solution of carbolic acid. The syringe and needle should be sterilized by boiling. The serum is slowly injected under the skin and the puncture sealed with cotton-wool and collodion. At least four thousand units should be injected at first, even in a mild case, but in a severe one or one seen after the third day, six or eight thousand units may be used. The actual quantity of serum injected varies with its concentration; that prepared by the British Institute of Preventive Medicine contains four thousand units in 10 c.c. In a favourable case the effect of such an injection is to cause the membrane to become softened and detached, and its further extension is checked. At the same time there is a marked improvement in the general condition and aspect of the

patient. A second injection should generally be given twelve hours after the first, and a third may be required after a similar interval, but this will depend upon the amount of membrane present and the condition of the patient. Should there be broncho-pneumonia, even more than three injections may be necessary.

It is important to remember that the immediate effect of the injection of anti-toxin may be a rise of temperature, but this is only temporary; rashes of an erythematous type, and pains and swelling of the joints have been noted in some cases. They are more likely to occur when a large quantity of serum has been injected, hence the importance of using a serum of high potency. It has been stated that post-diphtheritic paralysis is more common than formerly; if this be the case it is probably due to the fact that, thanks to the use of anti-toxins, many severe cases now survive and some of these succumb to paralysis later on.

Internally the tincture of the perchloride of iron (formula 19) should be given in large doses at frequent intervals, *i.e.*, 15 to 20 minims every second or third hour. The doses for children should be in proportion to their age; they generally bear full doses very well, a child of three years will take 5 to 10 minims of the tincture every three or four hours.

The general management of the patient is, if possible, even more important in diphtheria than in many other diseases. The temperature of the room should be maintained between 60° and 65° Fahr., and there should be ample ventilation. Except in very hot weather a fire is therefore desirable. The patient should be absolutely confined to bed, and the bed-pan should be used to prevent his having any occasion to get out. As keeping the patient at absolute rest in bed is a matter of

cardinal importance, the applications made to the throat should not, in the case of children, be such as to cause a struggle; it is better, in fact, to substitute some milder method of disinfection rather than upset the patient. For a similar reason medicines should be made as agreeable as possible and liquid food should be administered from a feeder.

The necessity for rest in bed does not cease with the acute stage; the occurrence of paralysis in mild cases points to the possibility of this complication being due to the patient getting about too soon. It is therefore advisable to keep the patient in bed for a week or two after all symptoms are over.

The diet should be light and nutritious, consisting of milk, eggs beaten up, beef-tea, chicken, and other broths, and food of some sort should be administered every two hours. Liebig's essence (formula No. 74) is a convenient method of administering easily digested nourishment. All forms of nourishment usually give most relief to the throat symptoms and are most easily taken when cold. Sips of ice-cold lemonade are often grateful to the patient by removing collections of sticky mucus in the throat.

Should dysphagia be a marked symptom, after cleansing the throat with an antiseptic spray, a 10 per cent. solution of cocaine may be painted over the pharynx. Deglutition is much facilitated by this means, and if care be taken not to apply the solution too freely, no harm need be feared from the cocaine. In some cases, especially in very young children, it may be necessary to feed the patient through the nose. This is effected by attaching a funnel to a gum-elastic catheter by means of a piece of india-rubber tubing, and then passing the catheter through the nostril into

the œsophagus. When vomiting follows the ingestion of food, it is well to rest the stomach by administering nutrient enemata or peptone suppositories. Ice to suck will relieve thirst, and it has also a beneficial local action. The external application of continuous cold by means of Leiter's coil, applied over the front and sides of the throat, has been highly recommended by some.

If the patient's temperature keeps high, *i.e.*, above 102° F., he should be sponged, and if the temperature still continues to rise, an ice-cap may be used, or the patient may be "packed."

A dry, brown tongue with typhoid symptoms suggests carbonate of ammonium, tincture of cinchona and nux vomica; Warburg's tincture may be used in this condition. Some authorities would assign the first place to alcohol in the list of remedial agents, and recommend that it should be always used from the commencement. Except in mild cases, its use is generally advisable; at times it may be necessary to give large doses. In addition to its action as a diffusible stimulant, it is also a valuable antiseptic agent. If the taste of brandy be disliked, absolute alcohol may be employed. Should symptoms of heart failure arise, digitalis or strophanthus must be given in combination with strychnine, and in urgent cases the latter drug may be administered hypodermically. As a temporary stimulant, musk is said to be the best. It can be given from a bottle in which it is simply shaken up with thin mucilage. Camphor in two to ten grain doses may be given for the same object.

When signs of deficient aeration of the blood exist, inhalations of oxygen should be employed; Massei also recommends its use in adynamic conditions, and in threatened paralysis of the vagus or phrenic nerves.

Diminution in the quantity of urine calls for full doses of liquor ammonii acetatis and hot drinks; if the skin be dry a hot air bath may be tried.

If symptoms indicative of laryngeal diphtheria occur the patient should be placed in a tent and a steam spray apparatus started. The water should contain some antiseptic, such as carbolic acid 1 in 40, eucalyptus oil ten minims to half a pint of water, or sanitas. The throat may be sprayed out with limewater or with a solution of papain and lactic acid (formula No. 60), and the patient should be instructed to make sharp, short inspirations in the hope of the spray passing into the larynx. The vapour arising from slaked lime has been highly recommended by Solis Cohen. In the meantime the general treatment should be kept up.

The relative advantages of intubation and tracheotomy are discussed in Part III., (*vide* Intubation); for the present we assume that tracheotomy should be performed in the event of stenosis of the larynx requiring it. What then are the indications for tracheotomy in diphtheria? The symptom that commonly demands this operation is dyspnœa; if the difficulty of breathing is steadily increasing, especially if there has been a suffocative attack, and if expiration is as laboured as inspiration, then no time should be lost in opening the trachea. Accompanying the dyspnœa will be found hoarseness or suppression of the voice, retraction of the supra-sternal, supra-clavicular, and epigastric regions and of the intercostal spaces, with more or less lividity. Experience has shown that the chances of recovery are much greater if the operation be performed early, than if it be reserved as a last resource, and the younger the child the greater is the risk in waiting. If the operation be delayed too long, the engorgement of the lungs,

which always accompanies sudden stenosis of larynx or trachea, leads to bronchitis and catarrhal pneumonia, and thereby brings about a fatal result. Watson Cheyne is of opinion that "tracheotomy ought to be performed in cases of diphtheria as soon as it is certain that the larynx is affected, chiefly with the view of preventing the spread of the membrane downwards." The operation itself is so fully described in all manuals of surgery that it is unnecessary to give the details of it. Parker strongly advises the high operation, and recommends that the patient should be anæsthetised. In favour of the low operation it may be urged that the trachea can be exposed more freely, that the opening is at a considerable distance from the larynx, and that granulations are less likely to develop than in the high operation. In a well developed young child with a short, fat neck a combination of the high and low operation is often necessary and there is little to be feared in dividing the isthmus of the thyroid. It cannot be too forcibly impressed on the surgeon that "tracheotomy is not a curative measure at all, but only a mechanical expedient to prolong life while therapeutic measures can be adequately applied." Hence local and constitutional treatment requires to be continued with the same earnestness as before the operation. Though there is some difference of opinion as to whether steam is useful after tracheotomy, there seems to be more evidence in favour of it than against it, so that most surgeons place the patient in a croup-bed, with a temperature of 65° to 70° F. In enclosing a patient in a tent, there is always some risk that he does not get a sufficient supply of pure air; this requires quite as much, if not more, attention than keeping the air warm and moist. If steam be not employed, a sponge,

wrung out in hot water and frequently changed, should be placed over the opening of the tube for the first twenty-four hours, after which, if the atmosphere be kept warm, a piece of gauze laid over the opening is all that is required. Immediately after the operation the child's chest should be protected with one or two thicknesses of Gamgee tissue, which not only keeps the chest warm but protects it against the damp cold arising from the condensed vapour of the steam spraying apparatus. A small layer of lint spread with iodoform ointment should be inserted between the tracheotomy tube and the raw surface of the wound, and changed twice daily at first, as it soon becomes soiled with secretions from the wound and trachea. The inner tracheotomy tube should be removed at least every hour and thoroughly cleansed in an antiseptic before it is returned; the cannula must be removed every day and a second one inserted or the first rapidly cleaned and returned. In about two days after the operation the silver tube should be replaced by a red rubber one, which is more comfortable and less likely to produce granulations or ulceration within the trachea. A nurse is indispensable during the first few days after tracheotomy in order to remove the inner tube or the cannula when it becomes blocked. The tube and cannula should be removed for increasing intervals of time, commencing about the third or fourth day or even earlier, provided the secretions from the trachea are fairly liquid and there are no other causes of laryngeal obstruction such as granulations, glottic spasm or paralysis.

As regards the prospects of recovery after tracheotomy, several points have to be taken into consideration. In the first place comes the character of the epidemic, hence the impossibility of arriving at any

definite conclusions from a few operations. The time of the year has a great influence, the operation naturally being more successful in the warmer months, June taking the first place. Insanitary surroundings of the patient, and the absence of skilled attendance will of course have a most deleterious effect. Solis Cohen remarks that "comparatively few children under two years of age are saved, not many over eight or nine, and adults only as the exception," inasmuch as tracheotomy is rarely required in the adult, except in cases where there is marked toxæmia.

If there be any symptoms of paralysis, the patient must be kept in the recumbent position until they have disappeared, or at all events until the pulse is regular, of normal frequency, of good volume, and the heart-sounds clear and strong. The tendency to sudden failure of the heart in diphtheritic paralysis is so marked, that in the early stage of the disease the greatest possible care is demanded. The patient requires the same diet as was recommended for the acute stage of diphtheria. Should the fluid return by the nostrils, the patient must be fed by an œsophageal tube, by a catheter passed down the nostril, or by nutritive enemata. Medicinally strychnine has given the best results. It may be given by the mouth or still better hypodermically. Clifford Beale has recorded a remarkable case of recovery after the subcutaneous injection of strychnine. The patient was in a complete state of prostration; nutritive enemata could not be retained. As he was unable to rid himself of bronchial mucus, it was necessary to invert the upper part of the body over the bed to allow the mucus to trickle out. The heart's action was very rapid and feeble, and a fatal termination appeared imminent. Under the influence of sub-

cutaneous injections of liquor strychninæ, at first three minims and afterwards five minims every four hours, steady improvement took place, and the patient recovered.

In addition to the administration of strychnine, massage and the use of electricity (both faradisation and galvanism) have a beneficial action. A change to the seaside will generally accelerate complete recovery.

Bearing in mind the great fatality of diphtheria, the question of the means to be taken to prevent its spread is a most important one. In the event of an epidemic of diphtheria occurring in a district previously free from it, the day schools in the neighbourhood should be closed, and all other aggregations of children prevented, as far as possible. If there be only isolated cases, it may suffice if children who complain of sore throat be prevented from attending school, and in order to detect the earliest signs of the disease the throats of all school children should be regularly inspected. No child who has had a sore throat should be allowed to return to school without a medical certificate, and in view of the length of time the secretions of the mouth remain infectious, the Paris Congress of Hygiene decided that a child ought not to be allowed to return to school, after an attack, until forty days from its commencement, or, we may now add, until the buccal secretions are found to be free from the Klebs-Loeffler bacillus.

If it has been considered advisable to break up a boarding school, a clear fortnight ought to elapse before the pupils are allowed to return; in this interval the sanitary arrangements of the school buildings should be thoroughly over-hauled. On the re-opening of the school, a daily medical examination of all the pupils

should be carried out for another fortnight, in order to nip in the bud any fresh attack.

If it be decided to treat the patient at home, he should be placed on the top floor of the house, if possible. The room should contain only furniture which is absolutely necessary, carpets, curtains, hangings, &c., being removed. A sheet saturated with a solution of carbolic acid (1 in 40) should be hung outside the patient's door. A separate set of spoons, cups, and feeding requisites should be reserved for his use. The discharges from the nostril and mouth should be received on pieces of soft linen or antiseptic handkerchiefs made of Japanese paper, and burnt in the sick-room. All linen and other articles of clothing should be disinfected, by being placed in a solution of corrosive sublimate (1 in 1000), before being sent to the laundry.

Nurses and others in charge of patients should be warned of the danger of coming into unnecessary contact with them, as by kissing, fondling, or carrying them about. Open sores on those in attendance on diphtheritic patients should be carefully protected from infection. A protective injection of anti-toxin should be administered, a quarter of the usual curative dose, *i.e.*, 1000 units, is usually sufficient. Loeffler recommends that a gargle of a solution of corrosive sublimate or of cyanide of mercury—1 in 10,000 of either salt—should be employed every four hours for five to ten seconds. The nurses should mix as little as possible with the other inmates, and only those in actual attendance should be allowed on the same floor with the patient.

The dead should at once be placed in coffins, screwed down and buried with all convenient despatch, and the

bodies should not be exposed to view, much less kissed or touched.

After the recovery or death of the patient, the room should be thoroughly disinfected by stripping the walls of paper, repapering, white-washing the ceiling, scrubbing the woodwork and floor, and finally disinfecting the room with sulphurous acid.

A factor in the diffusion of diphtheria is undoubtedly milk. Now that we recognise the fact that the milk may be infected as it flows from the udder of the cow, dairies should be under systematic inspection, and the local authorities should have full power to regulate the milk trade. Until this desirable object is attained, no unboiled milk should be consumed.

The part played in the spread of diphtheria by domestic animals, especially cats, is also to be remembered.

27. THE THROAT AFFECTIONS OF THE SPECIFIC INFECTIOUS DISEASES.

Smallpox.

Accompanying the eruption on the skin, there may be a similar condition in the pharynx and larynx; pustules have even been noticed as low down as the bronchia of the second or third order. The eruption may affect chiefly the mucous membrane of the lips and cheeks, or the tonsils and the hard and soft palate may be attacked; in the latter case there is usually much inflammatory swelling, sometimes going on to the formation of an abscess. Owing to the moisture of the mouth it is seldom that the pocks appear as well-marked pustules. They occur at first as whitish-grey,

slightly elevated spots, which soon soften and form superficial ulcerations. In the larynx the pustules give rise to the symptoms of a laryngitis occurring about the sixth day, usually, however, it is not of a severe character. Later on in the disease, *i.e.*, about the ninth to the twelfth day, when the swelling of the face has reached its maximum, an acute laryngitis with great œdema of the epiglottis and ary-epiglottic folds may occur. The progress of the inflammatory mischief is sometimes so rapid, that death may take place before relief can be obtained. Another form of laryngeal inflammation is that which is accompanied by the formation of a false membrane. It usually begins about the tenth day, runs a rapid and very fatal course. In some cases deep ulceration of the larynx with necrosis of the cartilages occurs. If recovery take place, cicatrization may give rise to so high a degree of stenosis, that tracheotomy may be required.

As in the other acute specific diseases, the excoriated condition of the mucous membrane of the upper air passages renders it vulnerable to the bacillus of diphtheria, hence a diphtheritic exudation may appear on the fauces, or the patient may have the signs of a membranous laryngitis. This form of laryngeal affection usually begins about the tenth day, and runs a rapid and fatal course. Fortunately it is a rare complication.

Treatment.—Where the eruption is limited to the mouth, antiseptic or slightly astringent gargles, such as formulæ 1, 3, 6 and 7, may be used, or effervescing lozenges containing 3 grains of chlorate of potassium and $\frac{1}{8}$ grain of cocaine may be given. Œdema of the larynx should be treated by scarification, or if necessary by tracheotomy.

Varicella.

Vesicles, having slightly reddened bases, may be observed on the palate, and often persist for some time, but on the lips, tongue, and cheek, only excoriations or small superficial ulcers are to be seen. In rare instances the eruption has occurred in the larynx.

Measles.

Almost invariably on the second or third day of the disease, an eruption of small red points or patches appears on the roof of the mouth and the velum of the palate, giving a stippled redness to the parts. The term "endanthem" has been applied to it. The presence of this eruption is of diagnostic importance before the rash on the skin has appeared, especially if the invasion be prolonged, and it may be of value in enabling measles to be recognised among the dark races of mankind, in whom the cutaneous rash is invisible.

Laryngeal catarrh may be met with in all stages of the disease. The hoarseness and cough, which are such frequent accompaniments of the first stage, point to the early implication of the larynx. This may commence during the eruptive stage, or its onset may be delayed until the rash is fading away. In severe cases of laryngitis ulceration of the mucous membrane and even an abscess may occur.

Membranous laryngitis is a rare but very dangerous complication of measles. According to Mackenzie it is even more fatal than the corresponding scarlatinal affection, eighty per cent. of the cases proving fatal. This complication is in the majority of cases true diphtheria. It usually comes on during the eruptive stage

when the rash is fading, but it sometimes arises later. Symptoms of laryngeal stenosis appear with great rapidity and are accompanied by a rise of temperature. Laryngeal paralysis has been met with as a sequel to measles.

Treatment.—If the laryngeal catarrh be troublesome and severe, the vapor benzoini (formula No. 68) can be inhaled three times a day, and a sponge wrung out in boiling water may be applied over the larynx. For the irritable cough which accompanies this condition, painting a little blistering fluid over the trachea just below the larynx will be found useful. The application should be made over a space not exceeding the size of a shilling, and it is advisable not to use too much of the fluid at first, as it is better to have to make a second application, rather than run the risk of setting up extensive vesication. If the cough becomes croupy, Goodhart recommends that the throat and fauces should be painted energetically with a solution of boric acid, or borax and glycerine, every hour or two.

The treatment of the membranous laryngitis of measles is the same as that for diphtheria.

Laryngeal paralysis should be treated with strychnine and electricity.

Rötheln (German Measles).

Sore-throat is an almost constant symptom of German measles, resembling the early stage of the scarlatinal sore-throat.

The soft palate and fauces are usually injected and swollen, but there is never sloughing.

Scarlet Fever.

In scarlatina simplex the soft palate and fauces are reddened and often slightly swollen; the uvula may become swollen and club-shaped from œdema. Secretions may accumulate in the lacunæ of the tonsils, giving rise to the appearance of ulceration. A certain number of persons who enjoy immunity from scarlet fever may, nevertheless, suffer from pharyngitis of greater or less severity when exposed to its contagion. In the anginose variety the fauces are at first a deep purple red. When the fauces are affected, the tissues externally, and especially the glands at the angle of the jaw, become swollen and brawny. In the course of two or three days superficial ulceration may occur in the tonsils, and the surface is covered with a yellowish exudation. Occasionally deep ulceration may occur, and death may result from hæmorrhage, but should recovery take place deep scarring often results, which later in life may be suspected to be of syphilitic origin. In scarlatina maligna the patient often dies so soon after the onset of the disease that there is not time for any marked change to take place in the throat. If the patient, however, survives the first onset of the fever, the fauces may become gangrenous and emit a horrible stench, and in these cases death from hæmorrhage is not uncommon. Scarlet fever, in cases in which the inflammation is very acute, is sometimes accompanied by the formation of a false membrane over the tonsils. In this exudation the streptococcus pyogenes, the pus staphylococci and putrefactive bacilli, but not the Klebs-Loeffler bacillus, are to be found.

Diphtheria may accompany the acute stage of scarlet fever, but this is very uncommon; it usually appears at

a late period of convalescence. The poison of diphtheria is conveyed to the scarlet fever patient, when the soil is in a most suitable state to receive it.

The mortality of post-scarlatinal diphtheria was formerly excessively high, owing to the disease having a tendency to spread to the larynx, but the use of the anti-diphtheritic serum, in these cases, has reduced the mortality even more than in primary diphtheria.

Ulceration of the larynx occasionally occurs in scarlet fever.

Even in mild cases of scarlet fever there is a great tendency for the inflammation to extend up the Eustachian tube, and as scarlatinous pharyngitis gives rise to serious trouble in the middle ear, deafness is a very common result.

Treatment.—In the mild form of scarlet fever, the only local treatment required may be some simple gargle, such as black-currant jam in water acidulated with dilute hydrochloric acid. In the anginose form, spraying out the throat and nose with antiseptic solutions (formulæ Nos. 52, 53 and 58) will be found useful. If sloughing and gangrene take place, the mouth should be sprayed or washed out with a mixture of iodine and carbolic acid (formula No. 59). Small children must be treated as directed at page 333. If diphtheria be a complication the treatment must be as for primary diphtheria, and in any suspicious case the anti-toxin should be used at once, without waiting for a bacteriological examination, so important is it to neutralize the toxin at the earliest possible moment.

Influenza.

A catarrhal condition of the pharynx and larynx exists in almost all cases of influenza. The more severe affections occur either during the height of the disease, or perhaps rather more frequently during convalescence. In many instances the affection appears to start from the naso-pharyngeal space; at all events the inflammation is here very intense and persistent. Usually marked swelling of the mucous membrane is noted, but occasionally there is a lacunar inflammation of Luschka's tonsil. In the pharynx there occurs acute pharyngeal catarrh, with swelling of the mucous membrane and dysphagia. Lacunar tonsillitis, with or without peri-tonsillitis, is also met with. Shelley has called attention to the existence of a vesicular eruption on the palate as a sign of influenza. The vesicles resemble tiny well-boiled grains of sago. In the epidemic of December, 1893, one of us (F. de H. H.) saw three cases of influenza with serious pharyngeal mischief; in all three high temperature and albuminuria existed. The first was evidently of the nature of phlegmonous pharyngitis, as there was great swelling of the pharynx followed by suppuration. This case recovered. In the other two a thin false membrane formed on the soft palate, resembling in some respects a diphtheritic exudation. Both these patients died.

In the larynx the conditions met with are very varied. In the milder cases, slight catarrhal laryngitis is observed, giving rise to hoarseness and aphonia. In the more severe cases there is congestion of the cords, varying in degree. Occasionally they are of a bright red colour, and the expectoration is tinged with blood, the so-called hæmorrhagic laryngitis. Œdema of the

larynx has been observed as a sequel of influenza. Superficial ulceration of the vocal cords not unfrequently occurs. Sometimes swelling of the mucous membrane is a marked feature, the inter-arytenoid folds being particularly affected. In cases of greater severity œdema and even abscess of the larynx have been met with as complications or sequelæ.

Fraenkel is of opinion that the duration of influenzal laryngitis is more protracted than the ordinary affection. Laryngeal paralysis is a not infrequent sequel of the disease. The most common form is paralysis of the adductors and tensors of the cords, but cases of paralysis of the abductors (unilateral and bilateral) have been recorded.

Treatment.—Apart from the treatment of the influenza there is nothing peculiar in the local conditions of the pharynx and larynx demanding any special attention. The various complications affecting these parts must be treated on the same lines as similar affections produced by other causes.

Enteric Fever.

At the commencement of the disease there may be some erythema of the pharynx, and the tonsils may be swollen, but there is nothing characteristic. Occasionally in typhoid fever a few small shallow ulcers, sharply limited, varying in size from a pin's head to a linseed, with a greyish coating and surrounded by a reddened zone, appear on the soft palate. The glands are not enlarged, there is no pain, and typhoid bacilli are not present. This condition is peculiar to typhoid fever, and lasts less than a fortnight. As it only occurs in cases of a severe type, it is of some prognostic importance.

In some instances enteric fever may commence as a laryngitis, that is to say, the symptoms of the local affection may, up to the end of the first week, so mask the general febrile condition, that it is not until the occurrence of the eruption and other characteristic symptoms of typhoid, that the diagnosis can be made with any certainty. Schuster has twice observed enteric fever commencing with laryngeal affections. Hyperæmia of the larynx (erythematous laryngitis) is not an uncommon symptom of typhoid fever, the hyperæmia being most marked on the ary-epiglottic folds. Such hyperæmia tends towards ulceration which may be the first stage of the same affection, to which the term "laryngotyphus" has been applied by German writers—a condition of grave prognostic significance. There are two chief forms of laryngitis in connection with enteric fever. The acute form comes on during the third week with hoarseness, dyspnœa (chiefly affecting inspiration, expiration being easy) pain and difficulty in swallowing. Tracheotomy is generally required on account of the increasing dyspnœa. At the *post mortem*, œdema of the larynx or purulent infiltration of the mucosa may be found, together with chondritis. The occurrence of such cases with ulceration and the presence of the Eberth-Gaffky bacilli in the part points, not only to the probability of the localisation of the typhoid virus, but also to the possibility of enteric fever being capable of communication by the breath and expectoration.

The chronic form generally shows itself after convalescence has begun, and sometimes not until recovery is apparently complete. There are all the usual symptoms of laryngeal stenosis, and œdema of the larynx, or impaction in the glottis of a piece of necrosed carti-

lage, may cause sudden death. Should recovery take place, there may later on be trouble in connection with the voice and breathing, arising from cicatrisation of the ulcerated part.

Post mortem the larynx is not infrequently found ulcerated, when there were no symptoms indicative of this condition during life. Generally a well defined ulcer is seen over one or both arytenoid cartilages, and as already mentioned the ulceration may extend down to the cartilages, setting up chondritis and eventually necrosis. Wilks has pointed out that typhoid ulceration of the larynx may lead to subcutaneous emphysema.

As in the other acute specific diseases a secondary diphtheritic deposit may occur on the fauces of patients suffering from typhoid fever. It usually occurs during the third week and is a serious and fatal, but fortunately rare complication.

Treatment.—In the simple inflammatory cases soothing and antiseptic inhalations (formulæ Nos. 68 and 71) may be ordered. In the more severe forms counter-irritation to the larynx by applying blisters externally has been advised. If laryngeal stenosis occurs, tracheotomy will be required; even if recovery takes place the cannula can but rarely be dispensed with, as in consequence of the extensive ulceration and necrosis which occur, the larynx has a tendency to collapse.

Typhus Fever.

Changes similar to those seen in enteric fever are also met with in typhus fever.

Whooping Cough.

In this disease there is a slight catarrh of the larynx in the first stage, which becomes intense during the spasmodic stage; and the hyperæmia extends into the trachea.

Glanders.

The mucous membranes of the pharynx and larynx may be affected in glanders. In the former, nodules followed by ulceration may occur, or it may be covered by a false membrane.

In the larynx catarrh and ulceration, giving rise to hoarseness, may be met with, and the larynx may even be attacked when the nose is free. In some cases œdema of the larynx necessitates the performance of tracheotomy.

28. ACUTE SEPTIC INFLAMMATION OF THE PHARYNX AND LARYNX (INCLUDING ANGINA LUDOVICI).

From clinical and bacteriological evidence Semon (and in this he was supported by the late Prof. Kanthack) regards the various forms of acute septic inflammation of the throat, such as "hospital sore throat," acute œdema of the pharynx and larynx, phlegmon and erysipelas of these parts, and sub-maxillary cellulitis or Ludwig's angina, as identical pathological processes varying only in their degree of virulence.

Although the streptococcus pyogenes is more often found in connexion with these inflammations than other

organisms, yet the staphylococcus aureus, micrococci, or bacillus coli communis may form the predominant microbial element causing the inflammation. It is possible that such organisms obtain entrance to the system through small abrasions in the mucous membranes of the throat, in the same way that Fehleisen's streptococcus erysipelatosus gains access by some small abrasion of the skin, or the poison of scarlet fever, diphtheria and other diseases through the medium of the fissures, which exist in the epithelium of the tonsils.

In Ludwig's angina it is highly probable that the streptococcus sometimes enters by way of a carious tooth, in other cases it has resulted from an extension of the inflammation of the lymphatic glands in scarlet fever, from injuries in the mouth, and in yet other instances, this type of sub-maxillary cellulitis has appeared in epidemic form. Jordan has pointed out the frequency with which chronic alcoholics suffer from this form of septic inflammation.

In cases of recurrent erysipelas of the face, the pharyngeal tonsil has apparently been the starting point of the erysipelas, and it is well known that the nose, especially when affected with chronic rhinitis, frequently gives rise to facial erysipelas. These facts should emphasize the importance of the careful examination of the nose and naso-pharynx in cases of recurrent erysipelas of the face, and they would also suggest a possible mode of origin of pharyngeal and laryngeal erysipelas, because if the disease can spread externally, there is no reason why it should not spread internally. Extension of the disease sometimes takes place from the larynx into the lungs through the lymphatics; or the larynx and lungs may be simultaneously affected.

Erysipelas of the pharynx and larynx, when secondary, usually extends by continuity, but cases have been recorded in which erysipelas of a remote part has been accompanied by erysipelas of the larynx.

Morbid Anatomy and Pathology.—In the milder forms the inflammation may be only characterised by a serous exudation, but in acute phlegmonous pharyngitis a diffuse purulent inflammation is found in the pharyngeal sub-mucosa and the tissues beneath, which extends to the larynx and cervical glands; as a secondary effect other organs are implicated. In bad cases the intense inflammatory process may terminate in sub-mucous sloughs of gangrenous tissue, such as may be seen in phlegmonous cellulitis of a limb. In erysipelas of pharynx and larynx, the presence of the streptococcus erysipelatosus of Fehleisen has been demonstrated.

Symptoms.—In the graver forms of septic inflammation of the throat, the disease is generally ushered in by chilliness or rigors, there is usually marked fever, and the temperature may reach 106° F. or even higher. The pulse, although full and bounding at first, quickly becomes frequent and feeble, and there is a great tendency to adynamia and delirium. The urine is frequently albuminous, and sugar is not uncommonly found. If the pharynx be primarily affected, pain in the throat and dysphagia are prominent symptoms, but the swelling of the mucous membrane, which takes place with great rapidity, soon leads to difficulty of breathing, even though the larynx be not affected. If the larynx be primarily attacked, hoarseness, very speedily followed by urgent dyspnoea are the characteristic symptoms. Infiltration of the epiglottis causes the sensation of a foreign body in the throat. Two forms of the disease have been described; in the one

the general symptoms attract most attention, in the other the local changes take the first place, or are at least of equal grade with the general infection. In either case the disease is characterised by its atypical course, depending upon the wandering character of the affection, and in this way resembling the fever of cutaneous erysipelas. For example, the fever may be high or low according to the virulence of the infection, a high temperature or rigors occurring late in the disease point to suppuration locally, or a more general infection. If extension to the lung occur, cough with abundant watery, sometimes bloody, expectoration comes on, together with the usual physical signs of oedema of the lungs.

In the pharyngeal variety, the tissues of the neck may become infiltrated and brawny, or, the disease may apparently start in the deeper structures and spread to the mucous membrane. On inspection the pharynx will be found swollen, of a purple-red colour, with a glistening, varnished aspect; the uvula is frequently greatly enlarged. When the tonsils are affected the appearance may be that of lacunar tonsillitis, with symptoms of soreness and stiffness of the throat, and general malaise. In bad cases of septic inflammation of the pharynx the process tends to spread downwards, and with the aid of the laryngoscope the epiglottis will be seen to be enormously swollen, as are also the ary-epiglottic folds, while the glottis is reduced to a mere chink; a view of the interior of the larynx is consequently quite out of the question, and the patient is in imminent peril of his life from asphyxia.

In sub-maxillary cellulitis the tissues under the chin become hard and brawny, the tongue is pushed upwards by the sub-lingual swelling, swallowing is diffi-

cult, and well marked constitutional symptoms are present. The inflammation tends to spread downwards towards the larynx, and suppuration or gangrene often occurs. If early treatment is not adopted the disease may prove fatal from blood poisoning, or from extension of the inflammation producing œdema laryngis.

Diagnosis.—The sudden onset of the disease, the rapid manner in which the affection spreads from one part of the mucous membrane to another, the gorged and dark red colour of the affected surface, the adynamic state of the patient, the tendency to dyspnœa, and the frequent presence of albuminuria, will usually enable the diagnosis to be made. The extension of the disease to the lymphatics and the brawny swelling of the neck, coupled with the discovery of the erysipelas streptococci in the diseased tissues, will of course put the diagnosis beyond doubt.

Prognosis.—The prognosis is always grave, not only on account of the local troubles which may, with the most unexpected rapidity cause death, but also on account of the general conditions brought about by the disease. The most common cause of death is failure of the heart; œdema of the larynx may come on so rapidly that death may occur before there is time for the performance of tracheotomy; extension of the disease to the lungs may set up a low form of pneumonia or pulmonary œdema; or lastly, the patient may die from general infection or cerebral complications. As a general rule, in a case which is going to recover, the inflammatory symptoms rapidly reach their height and rapidly disappear, in which case the patient makes an excellent recovery. Modern observation has corroborated the truth of the Hippocratic aphorism, "When erysipelas extends from within outwards it is a favour-

able symptom, but when it removes to the internal surfaces it is a deadly one.

Treatment.—The patient should be kept in bed in a room with a temperature of about 60° Fahr., an ice collar should be applied to the neck, and he should have pellets of ice to suck. If the patient be seen early a calomel purge is useful. The general treatment will consist of measures adapted to support the patient in overcoming the evil effects of the septic absorption, and to this end, constant feeding with liquid and assimilable food such as strong beef tea, beef essence (formula 74), raw eggs beaten up and milk are useful. If dysphagia be severe, nutrient enemata or suppositories may be necessary. Stimulants are usually called for because of the tendency to cardiac depression and failure. When the disease is confined to the pharynx, tincture of the perchloride of iron (formula No. 19) alone, or combined with 5 grains of quinine, should be given every three or four hours; if, however, the larynx be implicated, and there be any spasmodic attacks of dyspnoea, instead of the iron mixture, 10 to 20 grains of bromide of potassium should be administered, in order to diminish the tendency to spasm of the glottis. Salicylate of ammonium in 20-grain doses every three hours has been found especially useful in erysipelatous affections with great rise of temperature, associated with delirium and a tendency to cerebral complications.

Anti-streptococcic serum has been found of so much service in cutaneous erysipelas that it certainly should be tried in erysipelatous affections of the throat. 10 c.c. should be injected with the same precautions as are employed in using diphtheria anti-toxic serum, and the injection may be repeated in twenty-four hours, if necessary.

If, in spite of treatment, the symptoms of laryngeal stenosis increase, the pharynx and larynx may be painted with a 20 per cent. solution of the hydrochlorate of cocaine. The first effect of the cocaine is usually to cause a profuse secretion of mucus and saliva, followed by a notable diminution in the bulk of the swollen parts. In two or three cases of œdema of the larynx as a result of erysipelalous inflammation, in which scarification or tracheotomy seemed inevitable, I (F. de H. H.) have found that painting the swollen parts with cocaine has caused such a diminution in the swelling, that respiration has been rendered comparatively easy. If, however, after waiting for half an hour or an hour there be no marked improvement in the symptoms, the parts should be freely scarified, and for this purpose Mackenzie's guarded laryngeal lancet is the best.

Energetic counter-irritation by means of sinapisms to the throat, chest, back, and shoulder blades has been found most successful, and should certainly be tried. The question of tracheotomy will, of course, have to be considered, and if death threatens from obstruction to the respiration, it is clearly the duty of the surgeon to obviate this tendency by opening the windpipe, and not to delay the operation too long, until the patient's strength is exhausted and he is already semi-asphyxiated. In view of the somewhat unsatisfactory results of tracheotomy, the adherents of intubation have put forward a claim for it in the relief of the dyspnœa. It is only, however, in a very limited number of cases of laryngeal erysipelas that intubation can be attempted with any chance of success. In the great majority of cases the œdema comes on so rapidly that it is impossible to introduce a tube into the larynx, and in most instances

the glottis becomes almost entirely obscured by the greatly swollen epiglottis. Sajous, however, claims that under these circumstances brilliant results have been obtained in America by the use of the O'Dwyer tubes. In angina Ludovici, a free incision in the mesial line from the chin to the hyoid bone, and nearly two inches deep must be made early in the case—a thin serous discharge usually escapes, and the finger should be introduced into the wound in order to search for any localised collection of pus in the neighbourhood of a carious tooth—a large rubber drainage tube is finally inserted in the wound and hot boracic fomentations applied every hour until the inflammation subsides.

29. LEPROSY OF THE PHARYNX, LARYNX, AND NOSE.

Inasmuch as these parts are usually affected in the same patient, it will be convenient to discuss leprosy under the one heading. It will be out of place in such a work as this to enter upon the ætiology and pathology of leprosy in general, but as regards the latter it may be said that the disease is caused by a bacillus closely resembling the tubercle bacillus, and that Bergengruen has conclusively shown that the so-called "globi" are bacillary thrombi lying in the dilated lymphatics, that the lepra giant cell develops from the lymphatic endothelium, and that the spread of the disease is mainly by means of the lymphatics; we will therefore confine ourselves to the symptoms and appearances of the disease as they affect the organs mentioned in the heading of this section.

In *nerve leprosy* (anæsthetic leprosy) according to

Hillis the throat is not affected until the disease has existed for more than five years. Anæsthesia of the palate and pharynx may occur, together with a certain degree of motor paralysis; absorption of the nasal bones has been described.

Tuberculated leprosy usually begins with repeated attacks of fever, and epistaxis is a common symptom. The throat is almost always, sooner or later, affected. The throat symptoms first appear during one of the attacks of fever, about two or more years after the real commencement of the disease, and they are always secondary to the skin affection. Three stages may be recognised. In the first or erythematous stage the mucous membrane appears as though it were acutely congested. The pharynx exhibits signs of acute pharyngitis; in the larynx the mucous membrane, especially that covering the epiglottis, the ary-epiglottic folds and the edges of the vocal cords, is irregularly reddened. The patient at the time may complain of dryness of the throat and nose. After a time this hyperæmia gives place to a distinct pallor, not unlike what is seen in phthisis. The mucous membrane has a varnished appearance, and it increases in thickness, especially over the epiglottis and the entrance to the larynx. There is marked diminution of sensibility over the affected surfaces, so that patients may be quite unaware that anything is wrong with the throat.

The next stage begins with the formation of tubercles in the root or tip of the tongue, in the pillars of the fauces, the uvula, the buccal mucous membrane and in the nose and naso-pharynx. They vary in size and quickness of growth, from a pin's head to a hen's egg. The pillars of the fauces, especially the posterior, are usually much thickened and prominent. The ton-

sils are large and frequently fissured. Owing to progressive thickening of the mucous membrane, the lumen of the larynx becomes greatly diminished and the outline of the various parts is much altered, especially the epiglottis, which may resemble an œdematous prepuce. Tubercles may appear on the vocal cords, whereby their mobility is interfered with. These changes occupy weeks and months for their accomplishment before the stage of ulceration begins.

The ulcers, resulting from the breaking down of the tubercles, are at first small and round, but they extend until the deeper parts are affected. The uvula is often ulcerated and frequently destroyed. There is loss of substance in the soft palate and fauces followed by cicatricial contraction. The posterior wall is usually much ulcerated, and the ulcers are nearly circular. The epiglottis may be knobby, scarred, and drawn to one side. In the larynx ulceration penetrates to the cartilages, which finally become necrosed and may be expelled with the secretion. The disease, however, rarely attains this stage, because the patients usually die earlier.

The tuberculated form of leprosy manifests itself most frequently in the face. The nose becomes early implicated by extension from the alæ nasi. At first the nasal mucous membrane is red and velvet-like, then tubercles form, these ulcerate, the septum becomes perforated and the turbinals atrophy—similarly to what takes place in atrophic rhinitis. Owing to the destruction of its cartilaginous and bony framework, the nose may collapse.

The local affection comes on with dryness in the throat and fatigue in speaking. The voice gradually becomes hoarse and nasal, then shrill, and finally is reduced to a whisper, but complete aphonia only rarely

occurs. At first there is no difficulty in breathing or swallowing. As stenosis of the larynx comes on very gradually and is seldom very severe, tracheotomy is only exceptionally required; occasionally, however, sudden œdema may occur and necessitate this operation.

The swelling of the nasal mucous membrane may give rise to interference with nasal respiration, the sense of smell is usually abolished and there is a foetid discharge.

Diagnosis.—Leprosy affecting the mucous membrane of the upper air-passages requires to be distinguished from tuberculosis, lupus, cancer, and syphilis. The diagnosis is based partly on the characteristic differences of the appearances presented on inspection, but chiefly on the primary presence of the skin affection.

Prognosis.—As leprosy is practically an incurable disease, though Ramon de la Sota claims to have completely cured one patient, only temporary amelioration of the symptoms can be expected from treatment of the local lesions.

Treatment.—The nose, pharynx, and larynx should be sprayed with alkaline and antiseptic solutions (formulæ Nos. 50, 51 and 52). If ulceration occurs sprays of carbolic acid or insufflation of iodoform should be employed. Ramon de la Sota recommends a 1 per cent. solution of resorcin as a local application to ulcerated surfaces. Antiseptic gargles should be freely used, and the swallowing of infective material prevented.

Tracheotomy or intubation may be required in some cases.

30. GOUTY AFFECTIONS OF THE THROAT.

The frequency with which inflammatory and other conditions of the throat are attributed to gout, not only by the patients themselves, but also by their medical advisers, would lead one to expect that abundant evidence of the connection between these conditions and gout would be forthcoming. Careful pathological and clinical observation furnishes, however, but little evidence of this sort. Norman Moore has noted the *post-mortem* appearances in 80 cases of gout, and as one of his conclusions reports that "the articulations of the larynx rarely contain deposit," *i.e.*, of urate of sodium. Duckworth states that Garrod has met with encrustation of the arytenoid cartilages in one case, and that Virchow has detected a "tophus" in the posterior part of the right vocal cord. Uratic deposits have been found in the crico-arytenoid ligaments.

Turning to the clinical aspect of the case, Morell Mackenzie does not admit a case to be gout unless there have been distinct proofs of its existence. "The only absolute proof which I admit, is that the sufferer has some other distinct signs of gout." He gives the following examples:—(1) Acute œdema of the uvula disappearing upon sudden development of gouty inflammation of big toe; (2) Chronic inflammation of posterior pillars of the fauces occurring in a patient, suffering from long standing gouty disease of several joints of the fingers of both hands; no relief until treated with colchicum, mild purgatives, and alkalies; (3) Gouty deposit around the crico-arytenoid joints on both sides, causing permanent dysphonia; deposit in lobule of left ear; (4) Gouty

inflammation producing fungous ulceration of the left ventricular band, resembling cancer ; cured by a course at Wiesbaden.

Duckworth quotes Sir H. Halford in support of the view that there is a very painful but not suppurating form of angina tonsillaris which may, in the gouty, suddenly yield to an acute articular attack.

Harrison Allen takes a broad view of the question, and describes as gouty, a variety of sore throat which, while independent of metastasis, is found in gouty subjects, and which yields only to remedies for gout. In this condition patches of congestion may be found on the epiglottis, pharynx, and larynx, accompanied by pain on swallowing. It generally occurs in middle-aged subjects, and heredity is usually to be traced. It occurs among those subject to neuralgic forms of irregular gout, especially in the viscera ; or in persons of gouty habit who are careless in their diet, hence dyspeptic disturbances are common. It is not wont to occur during an acute attack. Thorner regards pain in the throat and intense hyperæmia as the principal symptoms of the gouty sore-throat. "The gouty throat" described by Duckworth is a gorged condition of the pharyngeal mucous membrane ; this kind of throat is seen in people who eat and drink too much and who take too little exercise. It frequently co-exists with hæmorrhoids. The patient may also be gouty, but the throat affection and the gout may be regarded as the result of a common cause.

Treatment.—If the gouty nature of the attack be clearly made out, the combination of colchicum and alkalies internally, with sedative inhalations (formulæ Nos. 67 and 71), or alkaline sprays with carbolic acid (formula No. 52), painting the pharynx with menthol

dissolved in almond oil (formula No. 43) or a sedative pastille and a light diet will commonly give speedy relief. If the breath be foul, tongue furred, and bowels confined, 2 to 5 grains of calomel should be given at once.

31. HERPES, URTICARIA, AND PEMPHIGUS OF THE PHARYNX.

Occasionally an eruption of vesicles, resembling those seen on the skin in cases of herpes, is observed on the pharynx. Accompanying the eruption there are shiverings and feverish symptoms. The patients complain of sore-throat, and on inspection small vesicles are seen on the palate and fauces; these speedily burst and form round ulcers.

Treatment.—The administration of quinine, and a gargle of chlorate of potassium or borax (formulæ Nos. 5 and 7) will usually suffice to effect a cure.

Laveran has described the case of a patient, thirty years of age, who was awakened with a severe attack of dysphagia. The uvula was enormously swollen, red, and œdematous, the tonsils somewhat swollen, and there was a large patch of urticaria on the tongue. For three years previous to this illness the patient had frequent severe attacks of urticaria affecting the face, hands, and limbs. Rendu, Montard-Martin and Sevestre have described similar cases.

Cases of pemphigus of the pharynx and larynx have also been reported. Mandelstamm has observed five cases in which the mouth, pharynx and larynx were affected. All the cases were very chronic and there were no bullæ on the skin. In the fifth case pemphigus

of the skin occurred some months after the larynx was attacked. The mucous membrane is at first covered with bullæ, and, when these rupture, with a large amount of white epithelium, often looking like diphtheria, but differing from it by the chronicity of the affection and by the absence of fever.

PART III.

DISEASES OF THE LARYNX.

1. THE EXAMINATION OF THE LARYNX.

Laryngoscopy.

FOR the purpose of making a laryngoscopic examination there are two essentials:—

(1) A source of light ; (2) The laryngeal mirror.

The light may be thrown directly into the throat ; more commonly, however, a mirror is used to reflect it. When obtainable the rays of the sun may be employed ;

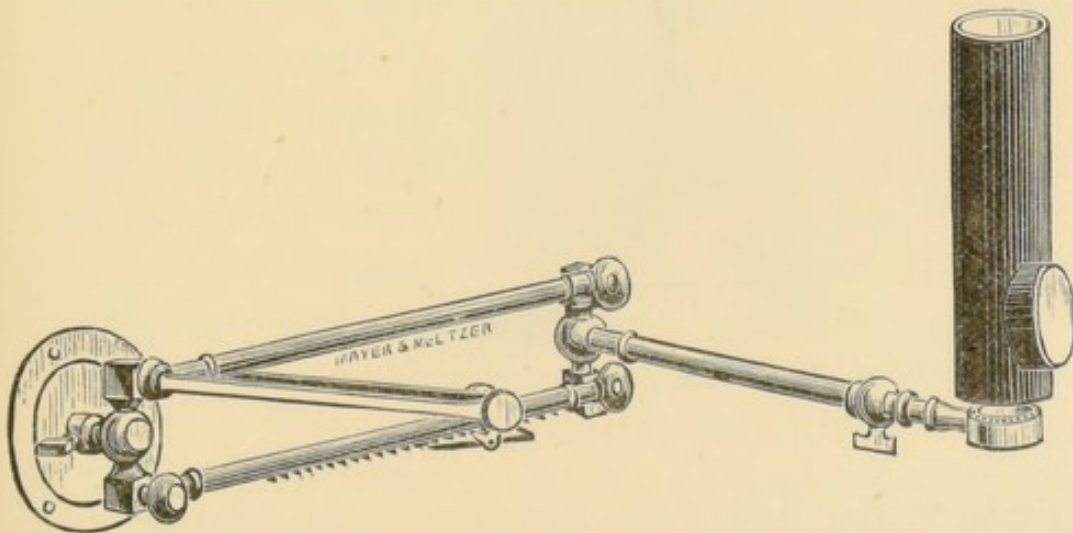


FIG. 54.—Mackenzie's Rack Movement Lamp, for wall.

in this country, however, we usually have to rely on artificial light. When gas is alone available Mackenzie's rack movement lamp (fig. 54) fitted with a Welsbach incandescent burner gives an excellent light.

If electric light can be obtained, then Macdonald's combined table and hand lamp (fig. 55) fulfils all purposes, and has the extra advantage that the lamp can be removed from the stand. A 32 candle power lamp gives a very satisfactory light. Though the limelight

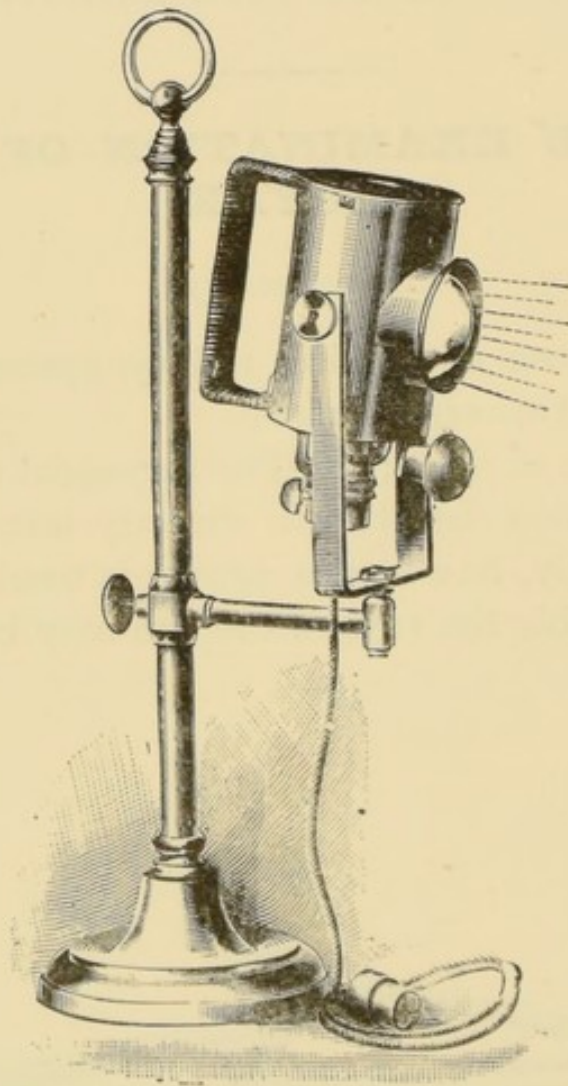


FIG. 55.

is perhaps the best light for viewing the interior of the larynx, still the daily trouble of fixing the lime in the lamp, and the frequent need of refilling the oxygen cylinders, have led most laryngologists to adopt some simpler apparatus.

In private houses an ordinary duplex lamp with

crystal oil will answer all ordinary requirements, especially if a sheet of white writing paper is held behind the burners to act as a reflector. A good bicycle lamp can often be obtained where ordinary oil lamps are not available.

The reflector is a circular mirror of three and a half inches in diameter, with a small oval hole, half an inch in length, in the centre. It is slightly concave and has a focal distance of fourteen inches. The reflector may be attached either to a band which encircles the head, or it can be fixed in a spectacle frame; the latter is the more convenient plan. The reflector may be worn on the forehead, in front of the nose, or opposite one of the eyes.

The laryngeal mirrors are made of glass backed with amalgam and mounted in German silver. They are fixed to the handle at an angle of 120 degrees. It is convenient to have mirrors of three different sizes, three-quarters of an inch, seven-eighths of an inch, and one inch in diameter respectively.

In making a laryngoscopic examination it is sufficient, in most cases, to have the patient sitting on a chair of about the same height as the observer's, but occasionally it may be necessary to elevate or lower the former, for which purpose a suitable chair has been contrived; it is, however, not often required, and can be dispensed with. The light should be on the left side of the patient, a little behind, and on a level with his ear, and he should sit upright, with the head slightly thrown back. The first step in the examination is so to adjust the reflector on the forehead, as to throw a cone of light directly upon the posterior wall of the pharynx. A few seconds should now be devoted to explaining to the patient the co-operation expected from

him. He should be told to breathe quietly during the examination, and to say "ah" or "eh" when requested. The laryngeal mirror is to be held like a pen, and cautiously warmed over the lamp, taking care to keep the reflecting surface towards the flame. A few seconds will usually suffice to warm the mirror; an intimation is given that it is warm, when the faint cloud of moisture on its surface clears off; to make certain that the mirror is not too hot, the physician should try it by applying it to his own cheek. The object of warming the mirror is to prevent its being dulled by the deposition on it of the watery vapour contained in the breath. The patient is now to be told to open his mouth, and to protrude the tongue; it is far better that he should thrust it out himself than that it should be dragged out. The physician then grasps the tongue between the thumb and fingers of the left hand, the thumb being above, and the tongue covered by a piece of linen or Japanese paper (fig. 56). In holding the tongue, care must be taken not to injure it by dragging it too far forward, or by pulling it down too much over the teeth. The laryngeal mirror should be passed rapidly backwards towards the soft palate, care being taken to avoid touching the dorsum of the tongue, or the roof of the mouth. The mirror should be placed under the uvula, and the soft palate pressed backwards and upwards; by a slight movement of the handle, the mirror may be adjusted to the varied position of the larynx in different individuals, or according as it is desired to inspect the anterior or posterior part of the larynx. When a good view of the glottis is obtained, the patient should be directed to say "ah" or "eh" in order to see that the cords move properly during phonation; in cases where the epiglottis is unusually over-

hanging, a momentary glance into the glottis may often be obtained by telling the patient to say "e."

One of the greatest difficulties experienced by the

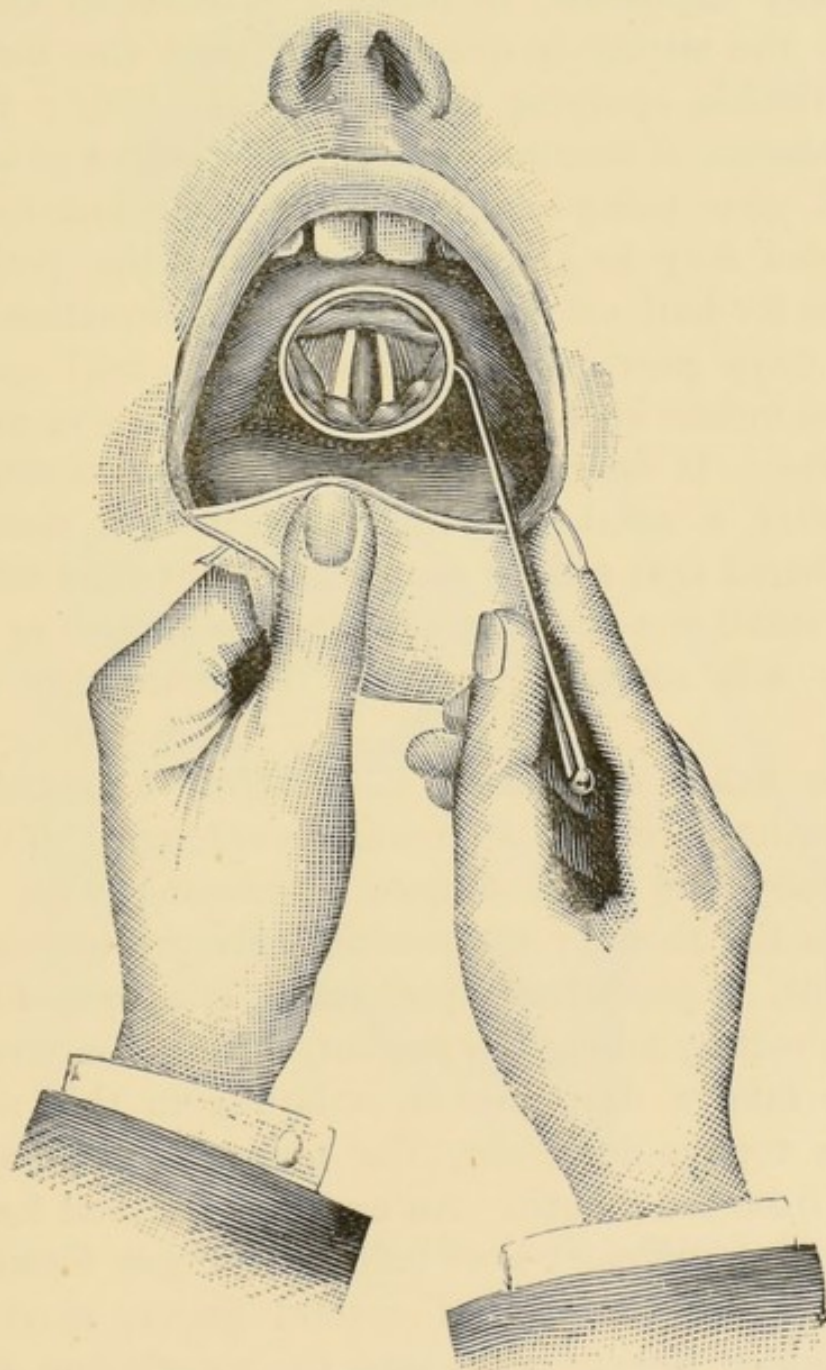


FIG. 56.—Method of making a laryngoscopic examination.

beginner in the art of laryngoscopy is the so-called "irritability of the fauces," but by patience and perseverance this will be overcome. It is much better to

make several examinations of the same patient, rather than by keeping the mirror too long in the throat to excite retching, for when once this has commenced, it is usually impossible to make a satisfactory examination at the sitting in question. Should the throat be very irritable, spraying the soft palate with a ten per cent. solution of cocaine will generally suffice to allow of a good view being obtained. In other instances the same end may be obtained by asking the patient to suck ice for half an hour before the examination, or for a few days previous to the same to avoid anything likely to induce such irritability, *e.g.*, excessive smoking or alcohol. It is well also not to make an examination soon after a meal. In this connection it should be remembered that a large mirror is often better tolerated than a small one and that allowing the tongue to recede a little will sometimes reduce the irritability of the fauces.

Three other difficulties in making a satisfactory examination are not so readily overcome. The first is a fleshy and thick tongue co-existing with a low vault to the mouth; the second, enlarged tonsils; and the third, a pendulous epiglottis. The first difficulty may be met by telling the patient, during the examination, to take a deep breath, or failing in this way, by using a tongue-depressor, the tongue not being protruded from the mouth. An excellent method for overcoming the difficulty is to hold the tongue forward by means of the thumb and second finger, leaving the index finger free to pass into the mouth and depress the tongue. A small mirror must be employed where the tonsils are large. Various ingenious instruments have been devised to obviate the difficulty presented by an overhanging epiglottis, but they are hardly ever

necessary; raising the patient's head and getting him to say "e" will usually allow of a momentary glance into the glottis. In exceptional cases it may be neces-

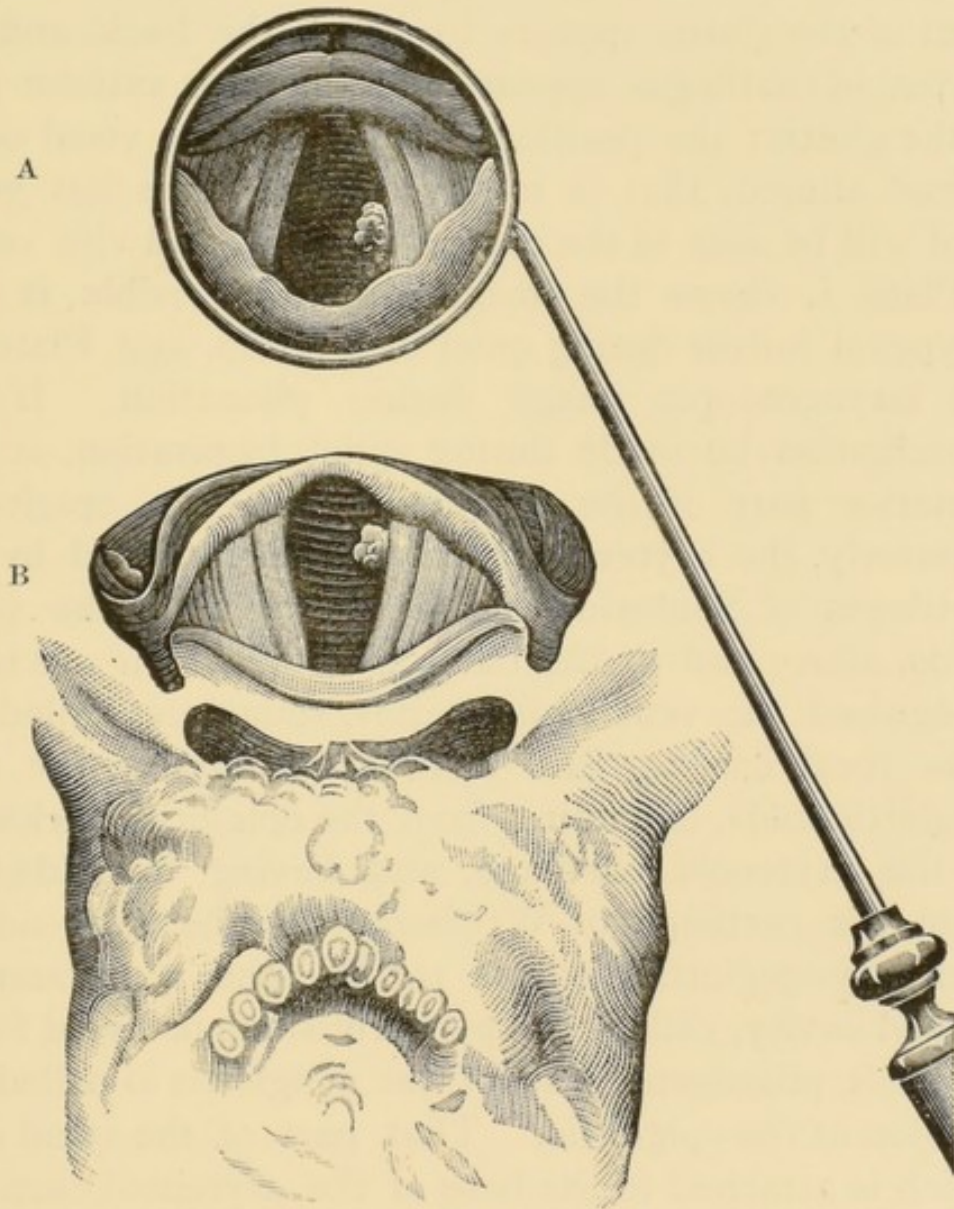


FIG. 57.—Drawing showing the relation of parts in the mirror (A) and the larynx (B).*

sary to cocaineise the anterior surface of the epiglottis and hold it forwards by means of a suitable retractor while the laryngoscopic mirror is held in the other hand.

* From Schroetter's "Vorlesungen ueber die Krankheiten des Kehlkopfes."

Having obtained a good view of the larynx (fig. 57), it must be remembered that the only alteration, in the position of the parts seen, is that the image in the mirror is reversed, *i.e.*, the epiglottis which is really in front of the glottis appears to be at the back, and the arytenoid cartilages appear to be the most anterior part of the glottis; the position (laterally) of the vocal cords is not altered, that is to say, the patient's left vocal cord will be seen to the observer's right, and vice versa.

Plate I. shows the image which is visible in the laryngeal mirror during quiet inspiration, and Plate II. the laryngoscopic image during phonation. If the examination be made during quiet inspiration, at the posterior part of the mirror is seen the epiglottis, anteriorly, the arytenoid cartilages surmounted by the cartilages of Santorini. Laterally are seen the vocal cords, above and to the outer side of which are to be recognised the ventricular bands, sometimes called the false vocal cords. Still more externally are the ary-epiglottic folds, extending from the epiglottis backward to the arytenoid cartilage, and having imbedded in them the cartilage of Wrisberg. To the outer side of each ary-epiglottic fold is to be seen a pyramidal-shaped cavity, called the pyriform sinus or hyoid fossa. The soft prominent base of the epiglottis is called the cushion of the epiglottis. That part of the vocal cord which is attached to the base of the arytenoid cartilage is called the processus vocalis. Between the ventricular bands and the vocal cords may sometimes be seen the entrance to the ventricle of the larynx. Lower down it may be possible to discern the cricoid cartilage and the rings of the trachea, and in exceptional cases the bifurcation of the trachea into the right and left bronchi.

PLATE I

LARYNX WITH THE VOCAL CORDS OPEN.

Shewing the position of the various parts above and below the Glottis during quiet inspiration.

(Twice the natural size)

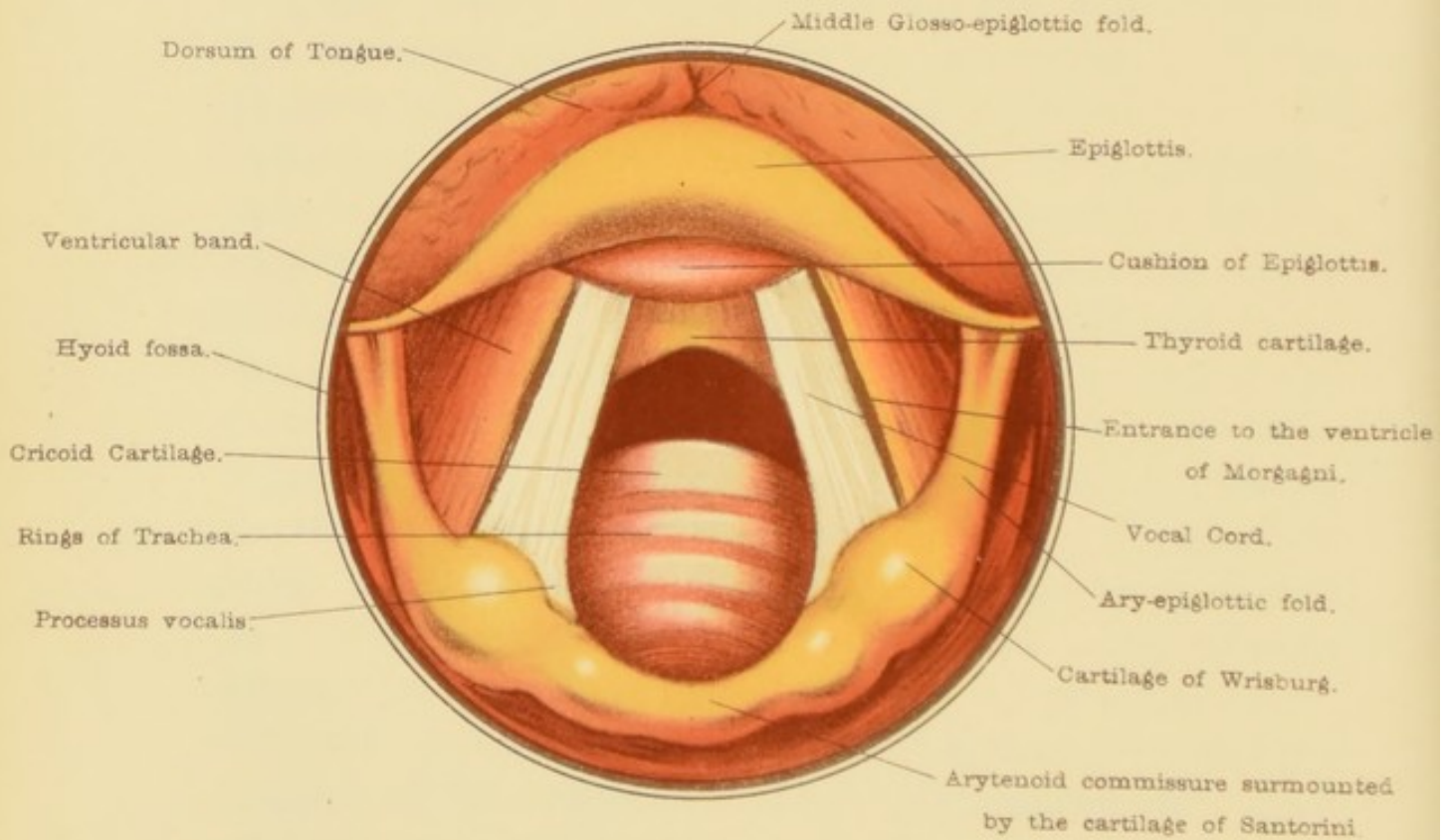
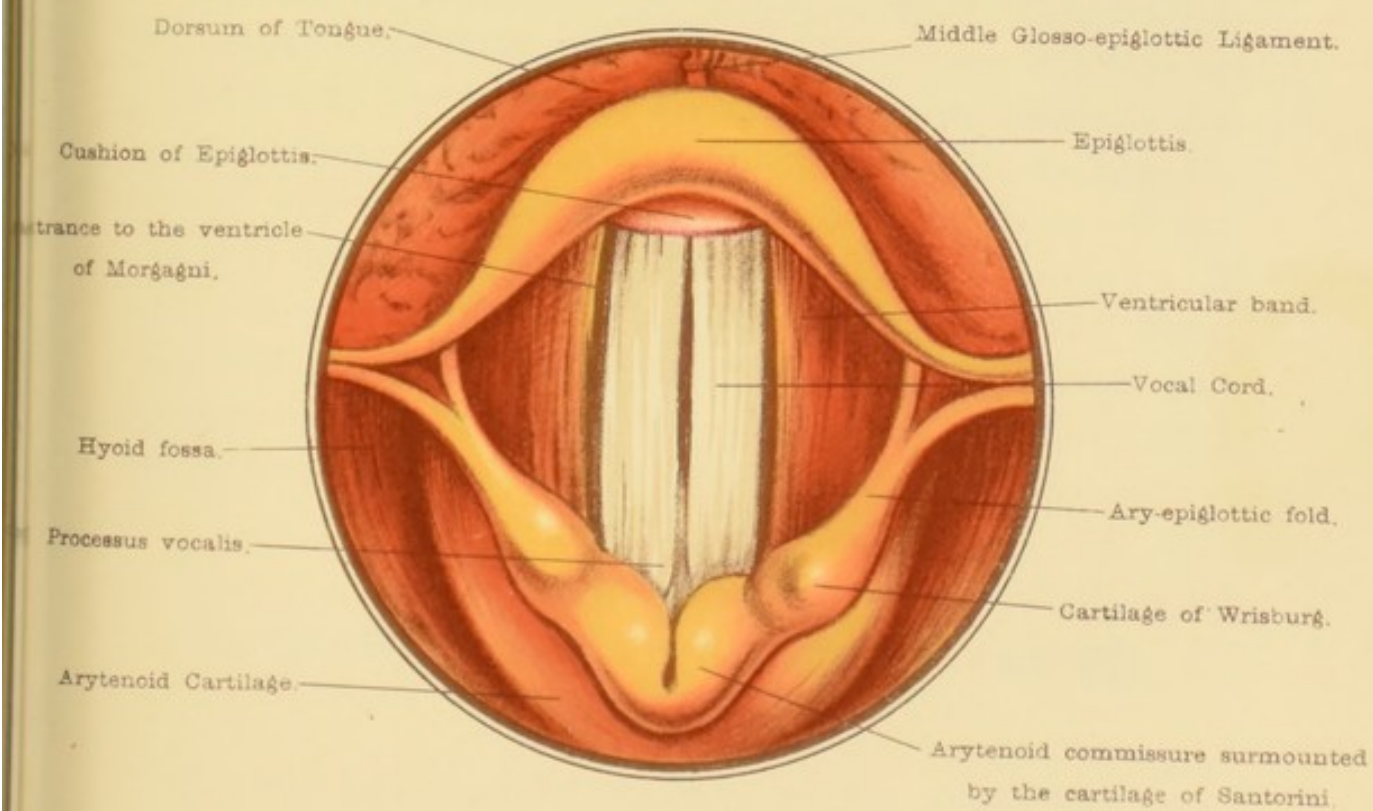


PLATE II.

LARYNX WITH THE VOCAL CORDS CLOSED.

As during the phonation of the French é.

(Twice the natural size)



As regards the normal appearance of these parts, Stoerk likens the colour of the epiglottis, the interior of the larynx below the glottis, and the cricoid cartilage, to the colouration of the eyelid; and the hue of the ary-epiglottic folds and the prominences of the arytenoid cartilages to that of the gums. The mucous membrane of the trachea between the rings is of a pale pink colour; the vocal cords have a white glistening look resembling that of normal incisor teeth.

It is desirable that a laryngoscopic examination be made methodically. The first glance should be directed to the colour of the mucous membrane, as the mere presence of the mirror sometimes sets up congestion. Having satisfied one's self as to the colour of the larynx, attention should be paid to the mobility of the cords and this both during phonation and deep inspiration; and, finally, note should be taken of the presence of new growths, ulcers, or other morbid appearances.

2. DIRECT LARYNGOSCOPY (AUTOSCOPY).

Kirstein has recently drawn attention to the fact that the upper air passages can be examined by direct inspection without the use of a laryngeal mirror. A suitably curved spatula is passed backwards to the lower part of the interval between the epiglottis and the base of the tongue, *i.e.*, to the root of the tongue, which is then drawn slightly forwards and upwards, at the same time the part of the tongue immediately under the spatula is depressed. The patient sits with the head tilted slightly backwards, the mouth being opened

less widely than is necessary for indirect laryngoscopy. The light is reflected into the mouth from a forehead mirror in the ordinary way. The method seems more particularly applicable in the case of children.

3. ACUTE LARYNGITIS.

Acute Laryngeal Catarrh.

This is an acute inflammation of the mucous membrane of the larynx.

Ætiology.—Of all the causes of acute laryngitis “catching cold” is the most common: its effect varies according to the idiosyncrasy of the individual; in one person a simple cold in the head will be the result, in another tonsillitis, and in a third laryngitis, and so on. A previous attack of laryngeal catarrh predisposes to a return of the complaint. The tendency to laryngeal catarrh is much increased by coddling and wearing an unnecessary amount of clothing, so that the skin is kept in a constant state of perspiration. Bosworth rightly lays stress on the fact that in a large majority of instances “there exists a mild chronic inflammation of the mucous membrane of the larynx, which, under the influence of an exposure, takes on an acute exacerbation.”

Occupation exercises considerable influence on the production of the disease in question. Persons who lead sedentary indoor lives, are much more prone to catarrhal affections than those whose avocations take them constantly into the open air. Sudden change of temperature, especially if accompanied with an excessive amount of moisture, is a potent cause of laryngeal

catarrh; hence catarrhal affections are most common in the spring and autumn. Cold applied to particular parts of the body, varying with the individual, is liable to excite an attack of catarrh; thus in one individual a draught of cold air on the head will produce it, whilst in another, getting the feet wet will act in the same way.

Among other causes of acute laryngitis may be mentioned over-use of the voice, such as shouting and singing, especially in the open air.

The abuse of stimulants predisposes to laryngeal catarrh, as do also irritant fumes, as of tobacco, chlorine, bromine, &c. As Von Ziemssen points out, if various causes co-operate the certainty of laryngitis being produced is greatly increased; consequently it is common with "loquacious frequenters of public houses, who carry their drinking, talking, and singing to excess, and after leaving the heated room, filled with tobacco and smoke, often expose themselves for a long time to the cold night air."

Any interference with free nasal respiration increases the vulnerability of the laryngeal mucous membrane, and consequent tendency to catarrh, and one of the most common sequences of events is for the catarrh to start in the nose, or naso-pharynx, and thence extend to the larynx. Among the causes of severe attacks of laryngitis may be mentioned the exanthemata, especially smallpox and measles. The recent epidemics of influenza have afforded abundant opportunity of studying laryngitis, as it is one of the most common complications of that very complicated disease. Lastly, traumatism may be mentioned as a cause of laryngitis. Such injuries as result from inhaling steam, children drinking from the spout of a boiling kettle, corrosive poisons, the application of caustics to the interior of

the larynx, or the presence of a foreign body, may give rise to violent inflammation of the larynx, hence the term traumatic laryngitis.

Morbid Anatomy and Pathology.—There is nothing in the pathology of acute laryngitis different from what occurs in acute inflammation of other mucous surfaces; in other words, there is the same swelling of the membrane with abnormal vascularity, accompanied by an increased production of epithelial and mucous elements. In the more intense forms of inflammation there is a rapid formation of cells, which are smaller and not so well developed; and this gives rise to a puriform secretion. Superficial ulceration may occur when the inflammatory condition is accompanied by violent coughing. After death, owing to the contraction which takes place, the mucous membrane may shrink and become paler than natural.

Symptoms.—When this disease occurs in the adult, the first symptom complained of is usually a sense of discomfort and irritation referred to the larynx, accompanied by a tickling, irritating cough, which is at first dry, but after a little time a small amount of clear mucous secretion may be expectorated. Occasionally the secretion is streaked with blood, and in very rare cases (see Hæmorrhage of Larynx, page 390) blood is poured out in considerable quantity. As in inflammation of other mucous surfaces, the secretion becomes muco-purulent when resolution takes place. Should the expectoration be very abundant, the presumption is that there is also a catarrhal condition of the bronchial mucous membrane. The voice is invariably affected in acute laryngitis; indeed in mild cases this is the symptom which attracts most attention. In severe cases the hoarseness may pass on to almost complete

aphonia, which, in women of a neurotic stamp may remain, after all acute symptoms have passed off—in fact, “functional aphonia” often dates from an attack of acute laryngitis. There may be pain on pressure over the larynx, and possibly some discomfort in swallowing; in very severe cases (see Œdema of Larynx, page 417) dyspnœa may be present.

These symptoms are usually preceded by those of an ordinary nasal or pharyngeal catarrh, and are ushered in by chilliness and rise of temperature; the pulse is frequent and full and the face flushed. If the disease advance unchecked, especially if serous infiltration (œdema of larynx) occur early, the countenance becomes anxious, pale or somewhat livid, the pulse feeble and irregular, and the usual signs of carbonic acid poisoning show themselves. The amount of obstruction to the entrance of air is indicated by the noisy, stridulous breathing, marked respiratory excursions of the larynx, and the great activity of the muscles of respiration. In children, owing partly to their tendency to laryngeal spasm, and partly to the narrowness of the glottis in childhood, dyspnœa is usually present, and comes on in paroxysms, so that a child who goes to bed with only slight catarrhal symptoms and a little hoarseness, may awake in the night with a start, in great terror and distress from difficulty of breathing. This condition constitutes one variety of the *croup* of the old authors. Attention has been drawn to the occurrence of pulsus paradoxus in children suffering from dyspnœa due to acute laryngitis, either simple or membranous. As the disease progresses, the symptom becomes more marked, so that the pulse may be almost imperceptible during inspiration. After tracheotomy the pulse resumes its regularity in volume and rhythm.

On laryngoscopic examination, in slight cases the vocal cords will be found of a rosy colour, either throughout their entire length, or in patches; in more severe cases the mucous membrane of the larynx, especially that covering the ary-epiglottic folds, is found to be thickened, forming in some cases pyriform swellings, which may reduce the rima glottidis to a mere chink; the epiglottis in such cases is found to be swollen and erect. If the vocal cords are visible they will be found swollen and much congested, and usually their mobility is impaired, either from inflammatory infiltration of the muscles acting upon them, or from swelling of the soft parts. Sometimes one cord is more inflamed than the other, or there may be an irregular distribution of the congestion. Percy Kidd has recorded a remarkable case of complete bilateral paralysis of the vocal cords, the result of acute laryngitis. This view of the case he grounded on the following reasons: "In the first place the loss of motion was absolute and symmetrical on the two sides. Secondly, recovery was comparatively rapid, and the adductors regained their full action before the abductors." In some cases the inflammatory mischief may extend into the crico-arytenoid joints, and cause temporary or permanent interference with the movement of the cords.

If the inflammation be very intense, or of a septic nature, suppuration is a frequent result. In this case a more or less localised tumour will be detected, and the colouring of the pus which has formed may even be recognised through the mucous membrane. In traumatic laryngitis, especially that due to drinking boiling water, the symptoms come on with great rapidity, and œdema of the larynx may occur in the course of two or three hours, or even sooner.

Diagnosis.—In the adult the diagnosis of acute laryngitis is easily made, but in the child there may be considerable difficulty, as just in those cases in which a laryngoscopic examination is most required, is there the greatest difficulty in making one with any degree of success.

Acute catarrhal laryngitis in the child has to be differentiated from spasmodic croup, or laryngismus stridulus; from membranous laryngitis; and from laryngeal diphtheria. From the former it is to be distinguished by the presence of fever and hoarseness, and by its onset being usually ushered in with coryza, and by the absence of carpo-pedal contractions. For the diagnosis from membranous laryngitis see page 390. The diagnosis from laryngeal diphtheria is more difficult, but in this affection there is generally some membranous deposit to be seen on the pharyngeal mucous membrane; there may be swelling of the lymphatic glands beneath the angle of the jaw, and albuminuria; the symptoms are of a more asthenic type; and the disease usually occurs in epidemics. It is well, however, not to be too eager to give a definite opinion at the commencement of a case.

Prognosis.—Simple catarrhal laryngitis almost invariably runs a favourable course in the adult; and even in the child, though the symptoms are more alarming and urgent, recovery takes place in a very large proportion of the cases. The fatal forms of acute laryngitis in the adult are those which are accompanied by œdema of the larynx, or depend upon the poison of erysipelas (see pp. 357 and 414). As regards the voice a good prognosis may generally be given, but in a few cases, especially after influenza, a want of tone in the muscles or even actual paralysis may induce hoarseness

or alteration in the voice which may prove very intractable to treatment.

Treatment.—The most important factor in the treatment of acute laryngitis is the attainment of functional rest. In endeavouring to fulfil this indication, the twofold function of the larynx (*i.e.*, phonatory and respiratory) must be borne in mind. Any reasonable patient will readily understand the necessity of abstaining from talking, so that one function of the larynx can be held more or less in abeyance. Only very partial rest can be obtained for the other function, but this is to be sought for by keeping the patient as quiet as possible; in severe cases he should be confined to bed, so as to diminish the frequency of the respirations. The temperature of the room should be 65° F., and the air moistened by means of steam from a bronchitis kettle, and the addition of a teaspoonful of the compound tincture of benzoin to the water in the kettle has a sedative effect; or an inhaler may be used with the same quantity of the tincture in a pint of water. The chloride of ammonium inhaler will also be found extremely useful in these cases. The way to obtain the greatest benefit from it is to direct the patient to inhale by the mouth, and exhale through the nostrils, for two or three minutes every hour or two. Much relief may also be given by inhaling from an atomiser a solution of menthol in liquid paraffin (grs. x. to ʒj.). The diet should be of an unstimulating nature and semi-solid, so as not to cause trouble in swallowing—bread and milk, rice, sago, tapioca, beef tea and mutton broth are the best. Equal parts of hot milk and Ems or Seltzer water will be found an agreeable and beneficial drink, and will relieve the feeling of dryness in the throat.

If the bowels are confined a saline aperient is indi-

cated. A diaphoretic such as formula No. 13 may be given every four hours, or pilocarpine $\frac{1}{16}$ to $\frac{1}{8}$ grain may be injected hypodermically. If the patient be very feverish 20 minims of antimonial wine, or 4 or 5 minims of the tincture of aconite, may be added to the mixture. If cough be irritating and troublesome formulæ Nos. 14, 16 and 17 may be ordered, or the morphine and ipecacuanha, or cocaine and rhatany lozenges. Chloride of ammonium in the form of tabloids or pastilles, or the Soden mineral pastilles will usually be of considerable service; they should be slowly sucked every two or three hours while the acute symptoms last. Should there be any delay in the disappearance of the symptoms, the treatment described under the head of chronic laryngitis (p. 400) must be employed.

Externally a cold compress may be applied to the throat, or in severe cases an ice collar or Leiter's tubes should be placed round the neck. The treatment to be adopted in cases of œdema of the larynx will be found at p. 418.

A difficult question frequently arises as to what should be done in the event of an actor or a professional singer being attacked with laryngitis during his engagement. In the first place, it may be emphatically stated that, just as there is no royal road to learning, so there is no special method of treating an attack of acute laryngitis in a professional. If the case be at all severe, at whatever cost he should rest, otherwise permanent damage may be done to the voice; in milder cases, sucking ice, keeping a cold compress to the neck, and the use of an astringent spray (Nos. 61 to 63) may suffice to enable the patient to get through his work. Attempts to cut short the inflammation, by the application with the brush of nitrate of silver or other strong

astringents, are not to be recommended. According to Sajous, hoarseness in professional vocalists may be due to deficiency of lubrication of the vocal cords. This condition he treats by the administration, every two hours, of 10 grains of ammonium chloride in a tumblerful of water, and the topical use of warm sprays of a saturated solution of potassium chloride at the same intervals. In this kind of case benzoic acid lozenges are sometimes beneficial. Strychnine in full doses has also a good effect.

As regards the treatment of attacks of catarrhal laryngitis in children, a warm and moist atmosphere is essential. If the onset be sudden, a hot bath, followed by a dose of castor oil or calomel, will often succeed in relieving the patient. The child should be placed in a bed surrounded by a tent, into which the spout of a bronchitis kettle projects. A teaspoonful of the compound tincture of benzoin should be placed in the water. A sponge, frequently wrung out in hot water, should be applied over the larynx, and some warm milk and water given to the child to drink. A diaphoretic, such as formula No. 13, in doses of one to four teaspoonfuls, according to the age of the child, should be given every three or four hours; if there be any tendency to spasm of the larynx, the addition of two to five grains of bromide of potassium to each dose will be found beneficial. Should the dyspnoea increase, a teaspoonful of ipecacuanha wine should be given every twenty minutes for three doses, unless emesis take place sooner, or $\frac{1}{35}$ to $\frac{1}{30}$ grain of apomorphia may be injected subcutaneously. In the event of no relief being obtained, and in the presence of signs of deficient entry of air, *i.e.*, some cyanosis, recession of the episternal, supra-clavicular, and epigastric regions, the

patient should be intubated, or, in the absence of the appliances for intubation, tracheotomy should be performed.

In traumatic laryngitis due to scald of the larynx, Morell Mackenzie says that "scarification, fairly and fully carried out, ought to supersede all other treatment." Inasmuch, however, as children are the chief victims of this accident, it is not easy to carry out this plan of treatment. The application of iced packs to the throat, and iced milk and water by teaspoonfuls, or small pellets of ice given every few minutes, should be tried. Early tracheotomy is usually necessary, and Gough advises that for the first twenty-four or thirty-six hours after the operation, the patient should be fed with nutrient enemata.

4. ACUTE EPIGLOTTITIS.

This term has been applied to cases in which the acute inflammatory attack is limited to the epiglottis. As a rule pharyngitis or laryngitis is present, but occasionally the epiglottis may be almost exclusively affected, being very much swollen and bright red or purple in colour; in this event there need be no symptoms referable to the larynx, *i.e.*, neither cough, nor hoarseness, but the patient complains of the feeling of a foreign body in the throat, which causes an inclination to vomit, pain and difficulty in swallowing, and profuse secretion of mucus. The cervical lymphatic glands are sometimes enlarged at the same time, the patient feels ill and the temperature is generally raised to 101° F. or higher. Dyspnœa may arise if the disease extends to the larynx. There may be tenderness over the hyoid

bone, and attempts at swallowing may cause laryngeal spasm. The fact that these cases may complicate, or become complicated by, angina Ludovici, or arise in unhealthy sanitary surroundings, tends to show that they are of septic origin.

The treatment is the same as for acute laryngitis, with the addition that it may be necessary to scarify the epiglottis with the laryngeal lancet. Meyjes found an iced spray of one-third per cent. watery solution of ichthyol, every quarter of an hour, quickly reduced the inflammation and swelling in this, as in many other forms of acute laryngeal and pharyngeal inflammation.

5. MEMBRANOUS LARYNGITIS.

A variety of laryngitis accompanied by the formation of a false membrane.

Ætiology.—Nothing definite is known as to the causation of a membranous laryngitis apart from diphtheria, except that traumatism is capable of producing a membranous exudation upon the surface of the laryngeal mucous membrane. Numerous cases, for example, of membranous laryngitis from scalds of the throat have been recorded. The entrance of eau de Cologne into the larynx has also produced an exudation. Many distinguished authorities decline to accept the view that membranous laryngitis (excluding the traumatic variety) exists as an affection independent of diphtheria. That sporadic cases of membranous laryngitis occur, in which it is quite impossible to detect diphtheritic infection, most men who have had much experience in practice will admit. These cases are of a more sthenic character than the diphtheritic, no exudation is seen in

the nares, naso-pharynx, or pharynx, and they are not followed by the diphtheritic sequelæ. The researches of Klein and others would seem to show that the streptococcus is the cause of the membrane formation in such cases. Membranous laryngitis is essentially a disease of childhood, occurring most frequently about the sixth to the eighth year.

Morbid Anatomy and Pathology.—A fibrinous exudation takes place on the surface of the mucous membrane, entangling in its meshes leucocytes and epithelial elements. It was at one time taught that a croupous exudation could be distinguished from a diphtheritic, by the fact that the former could be removed without leaving a bleeding surface, but that on attempting to peel off a diphtheritic exudation a raw surface would be left. This view is, however, no longer tenable.

Symptoms.—In describing acute laryngitis, it was pointed out that, in childhood, dyspnœa is an early symptom, and that it tends to be paroxysmal. This is especially true of membranous laryngitis, as after about twenty-four hours of feverishness, the voice becomes affected, and a croupy cough and evidences of laryngeal stenosis supervene. The breathing is hurried, the *alæ nasi* dilate, there are inspiratory and expiratory dyspnœa, recession of the supra-clavicular and epigastric regions, and cyanosis. The pulse becomes very frequent, and intermits during inspiration.

Diagnosis.—The chief difficulty is to distinguish simple membranous laryngitis from diphtheria. The chief diagnostic features of the latter have already been mentioned (see p. 330). We have only to add that in diphtheria early glandular enlargement and albuminuria usually occur, whilst in simple membranous laryn-

gitis they are absent. In the absence of the expulsion of membranes by coughing, which is a rare event, the diagnosis of membranous from catarrhal laryngitis is a matter of difficulty.

Prognosis.—The outlook in membranous laryngitis, whatever be its cause, is undoubtedly grave. The patients die from laryngeal or tracheal stenosis, and unfortunately we know of no remedies which are capable of arresting the formation of false membranes.

Treatment.—The directions given for the treatment of catarrhal laryngitis in children will apply equally to the membranous form, except perhaps that more may be expected from the judicious use of emetics, and that intubation or tracheotomy is more likely to be required. Calomel in 1 grain doses every hour or two hours till the bowels act, and then less frequently, is a treatment which has been highly recommended by some authorities, while others prefer and speak very highly of calomel fumigations. The latter may be carried out by volatilising 15 grains of calomel every two hours for two days and nights and then increasing the intervals.

6. HÆMORRHAGIC LARYNGITIS.

The term "hæmorrhagic laryngitis" has been applied to cases in which hæmorrhage from the larynx, independent of grave organic disease or traumatism, is the prominent symptom. In cases belonging to this category, the hæmorrhage is not merely an extravasation into the mucous membrane, but a free escape of blood. The term has been retained as it is commonly employed, but "laryngeal hæmorrhage" would perhaps

be a better expression, as there need not be any inflammatory mischief present in these cases.

Ætiology.—Hæmorrhagic laryngitis is a rare affection; it occurs most frequently in women, and more especially in pregnant women or puerperal convalescents; it has also been met with at the catamenial period. A case has been recorded in which the exciting cause was exposure to cold.

In persons with degenerate vessels, laryngeal irritation may give rise to violent fits of coughing, and thus lead to rupture of a small blood vessel. A strain of the voice and violent retching have also been known to produce laryngeal hæmorrhage.

There is no sufficient evidence to show that hæmorrhage from the laryngeal mucous membrane necessarily indicates a phthisical tendency on the part of the patient, nor, on the other hand, are phthisical patients more prone than others to suffer from laryngeal hæmorrhage.

Morbid Anatomy and Pathology.—Catarrh seems to be the most potent factor in the production of hæmorrhagic laryngitis. It acts by producing increased permeability, or tendency to rupture of the vascular walls, the immediate cause being an over straining of the larynx, as in crying, singing, or coughing. By some authorities, hæmorrhagic laryngitis is looked upon as a distinct affection, caused through disease of the walls of the vessels, and not merely an increase of an ordinary laryngeal catarrh in which the bleeding is produced by the detachment of dried secretion. This view is, however, hardly tenable, and hæmorrhagic laryngitis cannot, therefore, be regarded as an independent affection, similar appearances being observed on other mucous membranes. The blood may escape from the vessels

by diapedesis or by rupture. In some rare cases the hæmorrhage results from the detachment of firmly adherent crusts. Laryngeal hæmorrhage may occur in purpura, leukæmia, chlorosis, and other affections due to an altered condition of the blood; but in these instances the laryngeal symptoms are completely thrown into the shade by the general symptoms.

Symptoms.—The symptoms of hæmorrhagic laryngitis are those of an ordinary laryngitis, with the addition of hæmoptysis, which is partly brought about without any definite cause, and is partly the result of attacks of coughing. The hæmorrhage is mostly insignificant, only streaks of blood being noticed in the sputa; sometimes, however, the bleeding is very considerable, amounting to a tablespoonful, or even a cupful. The blood may coagulate in small or large clots, which may temporarily block the larynx. After the cessation of the bleeding, the symptoms of the laryngitis persist for some time, as hæmorrhagic laryngitis represents a rather intractable form of the disease. In a case which was under Fraenkel's care, and which has been most carefully described by him, the characteristic feature was the following cycle of events:—stridor, shortness of breath, expectoration of blood followed by free breathing. These symptoms were due, as Fraenkel was able to verify by the laryngoscope, to the alternate blocking of the larynx by blood-clots, followed by cough, which cleared the larynx and rendered the breathing free; the same series of events recurred from time to time. On making a laryngoscopic examination, besides the characteristic appearances of catarrh, only small blood-clots are seen. In some cases the bleeding point can be distinctly recognised.

Diagnosis.—The outcome of the discussion on hæmorrhages from the pharynx and larynx at the annual meeting of the British Medical Association at Glasgow, was a general agreement that hæmorrhage from the throat is exceedingly uncommon, and that in the majority of cases thus described the blood comes either from the lungs, nose, or mouth. Hence, before arriving at the diagnosis of laryngeal hæmorrhage, all other possible sources of bleeding should be carefully excluded; and even then it would be hardly right to assign it to the larynx, unless the bleeding vessel or a patch of congestion was visible. As Hodgkinson points out, the presence of blood in the larynx is of no diagnostic importance, as it may easily find its way there, not only from the lungs, but it may also trickle into the larynx from the nose or pharynx.

Prognosis.—As already mentioned, the moot point is the relation between hæmorrhagic laryngitis and pulmonary phthisis. In this connexion we must bear in mind the possibility of the blood from a laryngeal hæmorrhage passing down into the pulmonary alveoli, and setting up inflammatory mischief and eventually phthisis, the so-called *phthisis ab hæmoptoë*. There can, however, be no sort of doubt that, in the great majority of cases in which it was assumed that the hæmorrhage proceeded from the throat, and that the phthisis only developed later, the lung was really the source of the hæmorrhage, the physical signs being absent, or only faintly marked.

If it be possible to exclude phthisis, and in the absence of ulceration and traumatism, which are the two causes of serious hæmorrhage, bleeding from the larynx need not be regarded as a serious malady. Where ulceration exists, death may result from loss of

blood, from suffocation due to the blood entering the bronchi, or from the larynx being occluded by blood-clots.

Treatment.—In a case of bleeding from the larynx, the patient should be kept quiet in bed, ice should be applied over the larynx and to the nape of the neck, and ice pellets should be given to suck. The best way of bringing astringents into contact with the mucous membrane is by means of spraying; for this purpose solutions Nos. 61, 62, 64, and 65 should be used with the hand-ball spray apparatus. Where the hæmorrhage is slight and is due to the detachment of dry crusts, the use of a solvent spray, such as No. 50, will often suffice to stop the bleeding.

Some authorities object to painting the larynx in cases of hæmorrhage, alleging that it is injurious, as it detaches the clots and gives rise to a fresh hæmorrhage. Heryng, however, approves of painting with a solution of nitrate of silver. The galvano-cautery may be employed to control the hæmorrhage if the bleeding point can be recognised.

The inhalation of turpentine and oil of eucalyptus has its advocates. If the cough be troublesome, narcotics may be required to check it. Should the patient be plethoric, saline aperients act beneficially by relieving portal congestion. The attacks of dyspnœa, almost amounting to suffocation, due to the blocking of the larynx by blood-clots may cause the question of tracheotomy to be discussed. It is quite conceivable that under certain circumstances this operation might be required, but the authors have not come across the record of a case, in which the trachea has been opened on account of the glottis being blocked by clots from a laryngeal hæmorrhage.

7. CHRONIC LARYNGITIS.

Chronic Laryngeal Catarrh.

This is a chronic inflammatory condition of the mucous membrane of the larynx.

Ætiology.—The causes of chronic laryngitis are practically the same as those producing the acute form of the disease; in some cases, indeed, chronic laryngitis supervenes upon one or more attacks of acute catarrh of the larynx, but in the majority of instances its onset is more gradual.

As would be expected, on account of their greater exposure to the various causes, males are more often affected than females. Adults are, for a similar reason, more often attacked than children. Over-use, associated with faulty production of the voice, is a very common cause of the disease; hence clergymen, actors, singers, schoolmasters, &c., are prone to be affected. Using the voice in the open air is particularly injurious, as is shown by the frequency with which itinerant vendors of all kinds are attacked—though, of course, other causes come into play in individuals of this sort; viz., exposure to changes of weather, and the abuse of alcohol or of smoking. Occupations attended with the production of dust or irritant gases (stonemasons, potters, knife-grinders, chemical manufacturers, &c.), and trades in which work is carried on in badly ventilated rooms, or where there are sudden transitions from heat to cold (compositors, tailors, bakers, &c.), will induce attacks of chronic laryngitis. Anything which impairs the general health predisposes to attacks of chronic laryn-

geal catarrh on slight provocation. Some cases of chronic laryngitis do not yield to treatment, until attention has been paid to the digestive system, showing the sympathy existing between different mucous surfaces. Over-feeding, leading to plethora and portal congestion, is frequently accompanied by a very characteristic form of laryngitis, in which the mucous membrane is much congested.

Chronic cardiac and pulmonary diseases give rise to passive congestion of the larynx. Too much stress cannot be laid on the great influence exercised by impeded nasal respiration in the production of chronic laryngitis. It is only of late years that attention has been directed to this connexion, but it is already recognised that the nose and naso-pharynx require to be carefully examined in every case of laryngeal catarrh. It is not only nasal stenosis which acts injuriously on the larynx, but any condition of the nose, which interferes with the air being properly warmed and moistened as it passes over the nasal mucous membrane; hence, atrophic rhinitis is frequently accompanied by a dry and glistening condition of the pharynx (pharyngitis sicca), and occasionally by a similar state of the larynx (laryngitis sicca). Lastly, all affections of the larynx of any standing, *e.g.*, tuberculosis, lupus, syphilis, benign and malignant new growths, &c., are usually accompanied by more or less chronic catarrh.

Morbid Anatomy and Pathology.—From an anatomical point of view there are three chief forms of chronic laryngitis. In the first variety, the mucous membrane of the larynx is hyperæmic and swollen, and there is a general or local increase in the thickness of the mucous membrane, chiefly due to cell proliferation in the sub-epithelial portion of the mucosa. The ven-

tricular bands may be so thickened as almost to hide the vocal cords, or the cords themselves may be thickened and irregular and thus constitute a form of pachydermia. Such a thickening of the mucous and sub-epithelial structures is often seen in the inter-arytenoid space. Ulceration is rare in simple chronic laryngitis, but there may be superficial abrasions. In the second variety, to which the term "atrophic laryngitis" has been applied, the mucous membrane is thinned and pale, and the glandular structures are atrophied. In the third variety, called glandular laryngitis (or, improperly, follicular laryngitis), there is some thickening of the mucous membrane, but the chief characteristic is the enlargement of the racemose glands. The orifices of these glands may become occluded and their contents escape by ulceration. Morell Mackenzie has applied the term "phlebectasis laryngea" to certain rare cases, in which there is a varicose state of the veins of the epiglottis, ventricular bands, vocal cords, and the arytenoids.

Symptoms.—The symptoms are all referable to the larynx. The patient experiences a sense of uneasiness and tickling in the throat, which causes a frequent desire to clear the throat, *i.e.*, the cough is of a voluntary character. Involuntary cough is rare in chronic laryngitis; if present to any marked degree, probably the trachea or bronchi are involved. The expectoration is usually scanty, consisting chiefly of small pellets of mucus; if it be very abundant there is usually some concomitant tracheitis or bronchitis; occasionally, however, laryngitis is accompanied by a profuse secretion (laryngorrhœa). The voice is always more or less affected, varying from slight degrees of hoarseness up to complete loss of voice. The hoarseness is generally

worse when the voice is first used, especially in the morning; after a little use it regains some amount of power, but fatigue is soon felt if talking be continued for any time.

On making a laryngoscopic examination, the cords will be found to have lost their normal whiteness, and to vary in colour from a pale pink to a bright red; but the colour is never so intense as in acute laryngitis. Sometimes only one cord is affected; indeed, the congestion may be confined to a portion of the cord. The whole larynx has a dingy or smoked appearance, and its mottled colour contrasts with the delicate and uniform coloration of health. Viscid mucus will usually be found adhering to the laryngeal mucous membrane, especially in the arytenoid commissure, and on phonation the cords may stick together momentarily. Accompanying the congestion there is occasionally loss of mobility, or defective tension in the cords, so that on phonation they do not come into apposition, but leave an oval gap between them. The foregoing describes the usual laryngoscopic appearances in the milder form of simple chronic laryngitis. In some cases there is so much increase in the mucous membrane, that the term "hypertrophic catarrh" has been applied to them; in others, the most noticeable feature is the thinning of the mucous membrane. In glandular laryngitis, the dilated orifices of the glands may be seen on the arytenoids, the epiglottis and posterior parts of the vocal cords; looking, according to Mackenzie, like "pale specks on the congested membrane, or as small red circles on the pale membrane." Superficial abrasions of the mucous membrane are not uncommon in chronic laryngitis, but anything like deep ulceration is extremely rare. As a result of long-continued inflammatory action, a hyper-

plastic condition may be set up and distinct outgrowths may occur from the ventricular bands, vocal cords, and other parts of the larynx.

Diagnosis.—As laryngeal tuberculosis, in the early stages, usually presents the appearances of a chronic laryngeal catarrh, it is important that, in cases of any standing, the lungs should be carefully examined and the sputa submitted to microscopic examination for bacilli. Again, a patch of congestion limited to one cord, especially when granular in appearance, should make one suspicious of early tuberculous laryngitis. The diagnosis from malignant disease is at times very difficult, but the occurrence of thickening and congestion of one cord, with defective mobility of the same, in persons over forty, should give rise to serious suspicion that the affection may be of a cancerous nature. In chronic laryngitis impaired mobility, congestion, and hyperplasia are generally bilateral.

Prognosis.—Even under favourable circumstances, the course of chronic laryngitis is very uncertain, and there is great tendency to relapse. The danger of permanent damage to the voice, or of the inflammatory state giving rise to a new formation must be borne in mind. That chronic laryngitis ever goes on to laryngeal phthisis is more than doubtful. In all probability there was a tuberculous element from the outset in those cases in which the transformation has apparently been observed. As regards risk to life, the only way in which this may occur is in the supervention of œdema, or perichondritis, both of which are very uncommon. The danger of the hyperplastic form will be treated under the head of Chronic Sub-Glottic Laryngitis.

Treatment.—The only local treatment of any avail in chronic laryngitis is the direct application of astrin-

gent remedies to the larynx by means of the brush (fig. 58), or laryngeal syringe.

In the milder and less chronic cases a solution of chloride of zinc (grs. 10 ad ʒj.) or perchloride of iron (gr. 5 ad ʒj.) is a good application and will usually suffice to effect a cure. The application should be made at least three times a week at first and then with diminishing frequency. In the event of spasm being excited, the patient should be told to hold his breath and then to breathe gently through the nose; if this be not sufficient, sipping a little cold water will usually

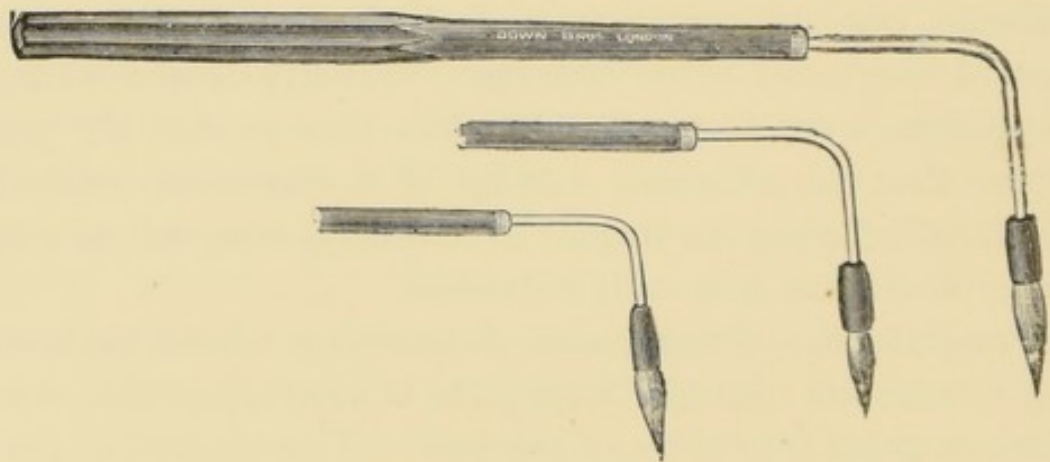


FIG. 58.—Laryngeal Brush.

have the desired effect. In order to avoid this experience, unpleasant alike to patient and physician, a fine laryngeal spray has been advised (fig. 59). The nozzle is guided to the aperture of the larynx with the aid of the laryngeal mirror, the patient then adducts the cords by saying “e,” while the injection is simultaneously made. The method is a good one, because apart from being better for the patient, it does not rub or irritate the chronically inflamed parts as is the case when a brush or wool mop is used.

In the more chronic cases with thickening and

hyperplasia of the parts, a stronger solution than the above may be necessary, the zinc preparation being used in the strength of 20 to 30 grains to the ounce. A caution should be here added to the effect that the latter strength of solution should never be used as a first application, since a violent and somewhat alarming reaction in the shape of laryngeal swelling and oedema may ensue.

Some authorities prefer nitrate of silver to chloride of zinc, and consider that in cases of long standing, it is advisable to commence treatment with nitrate of

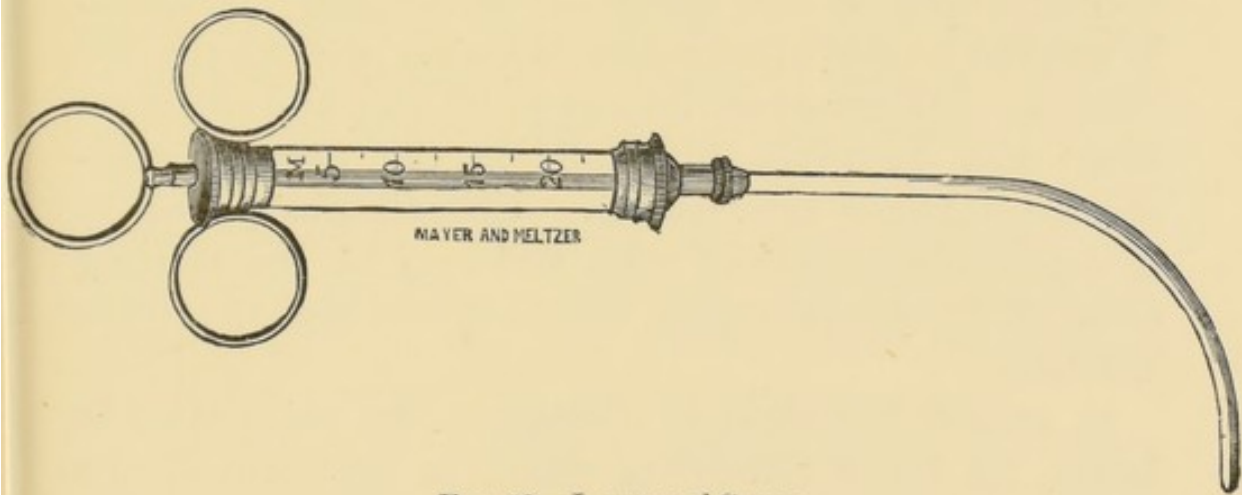


FIG. 59.—Laryngeal Spray.

silver and not to waste time in trying chloride of zinc. The plan of treatment that the authors have found most successful is that laid down by Semon. He recommends solutions of 16, 24, 96, and 240 grains to the ounce, beginning with the milder solutions and only gradually passing on to the strength which is deemed necessary in the individual case. The applications are to be made in the same manner as described above for chloride of zinc. There is only one drawback to the employment of strong solutions of nitrate of silver for any length of time, and that is the possibility of argyria occurring. The author (F. de H. H.) once saw this

condition as the result of applying a solution of silver nitrate to the pharynx during some weeks. Where there is much thickening of the cords, lactic acid, from 30 to 50 per cent. solutions, also gives excellent results.

Various astringent sprays (formulæ Nos. 61 to 65) will sometimes be found of use in the intervals between the application of astringents with the brush, but unfortunately sprays cannot replace the brush or direct injections. Inhalations of creosote, turpentine, or of the oil of the Scotch fir, may be ordered in addition to the painting of the larynx, but they are of only limited utility in the treatment of chronic laryngitis. When the laryngeal secretion is scanty and viscid, the chloride of ammonium inhaler is of use, and the same drug may be given internally in the form of compressed tabloids or pastilles. Chronic pharyngitis is so frequently associated with, and may be the starting point of, chronic laryngitis, that it should always receive attention.

If, after the removal of congestion, the voice remains feeble, the use of electricity, either in the form of the continuous or of the interrupted current, will be found very beneficial, while strychnine in full doses is often of great help in restoring the tone of the laryngeal muscles.

The dependence of chronic laryngitis on diseases of the nose and naso-pharynx should lead to these cavities being carefully examined in all cases, and any abnormal conditions being, as far as possible, rectified. Attention should be paid to any of the causal conditions, such as excessive smoking, drinking, or the over-use of the voice. With respect to the latter, Semon is right when he says:—"It is perfectly useless to attempt a cure if the same mischievous conditions, which have most likely produced the disease, *i.e.*, excessive use of the

voice, is continued during the treatment." In professional voice users, *e.g.*, singers, preachers, school-board teachers, &c., a proper method of voice production is essential, for whatever may be the direct cause of their breakdown it is often associated with, and aided by, improper methods of breathing, the wrong use of the registers, or the constant strain imposed on the pharyngeal and laryngeal muscles by speaking at too high a pitch. This is especially the case in female school-board teachers.

As regards general treatment, the patient's health must be improved as much as possible; coddling undoubtedly increases the tendency to laryngeal catarrh, so that the neck should not be wrapped up; at the same time, allowing the beard to grow has often a very beneficial result. Sponging the chest and neck with cold water, in cases where a cold bath is not taken, is of great service; regular exercise should be enjoined, and hot and crowded rooms are to be avoided.

The diet should be simple; spices, pickles, and highly seasoned articles of food should be eschewed; spirits, as a rule, are best abstained from, and if alcohol be taken at all it had better be in the form of a light wine. Excessive tea-drinking should be avoided. Any dyspeptic troubles should receive appropriate treatment, and if there be symptoms of plethora, a blue pill, followed by a course of mild saline aperients, or the daily use of some mineral water, will be found beneficial. After local treatment has been duly carried out, great benefit will often result from a course at Ems or Aix-les-Bains, followed by ten days or a fortnight at some bracing place.

Laryngitis sicca is often complicated by a chronic tracheitis and bronchitis, the first condition may be

treated by spraying out the larynx with a mild alkaline solution (formula No. 50). After the larynx has been thoroughly cleansed, astringent and alterative applications should be made with the brush (formulæ Nos. 36 and 41). Much success attends the treatment of the tracheal and bronchial condition by intra-laryngeal injections of menthol in liquid paraffin grs. x. to ʒj., a two per cent. guaiacol solution, or a combination of the two solutions. About a drachm of the solution is injected at a time, the nozzle of the syringe being passed below the vocal cords.

8. CHRONIC SUB-GLOTTIC LARYNGITIS.

This term has been applied to one of the very rare results of chronic laryngeal catarrh. It consists of a hyperplasia of the connective tissue of the under surface of the vocal cords. This condition has also received the name of *chorditis vocalis inferior hypertrophica*.

Ætiology.—The same causes which give rise to the ordinary form of chronic laryngitis may also lead to the sub-glottic variety. Stress has been laid upon excessive cigarette smoking as being a cause of this disease.

Zwillinger is of opinion that the hypertrophy is sometimes a manifestation of rhinoscleroma. Vierordt has noticed a combination of goitre and laryngitis hypoglottica in two cases, and that there was some relation between the two conditions is shown by the fact that if there was an exacerbation of the laryngitis, there was also an increased swelling of the goitre.

Symptoms.—The voice is affected very early. At first hoarseness occurs; after a time the voice may be almost completely lost. A barking, troublesome cough

has been described. Gradually increasing dyspnœa is, however, the symptom which attracts most attention. As a result of the progressive narrowing of the glottis, the obstruction at last becomes so great that suffocation would take place unless tracheotomy were performed. Occasional intercurrent attacks of a sub-acute nature may cause temporary aggravation of the symptoms, and even necessitate the immediate performance of tracheotomy. In some cases, attacks of suffocation are brought about by the vocal cords being stuck together by viscid mucus.

On laryngoscopic examination, the glottis will be seen to be narrowed by a tumefaction beneath the cords, which is sometimes of a pale red, at others of a dirty white colour. This swelling diminishes not only the transverse diameter of the glottis, but also the antero-posterior. The swelling is usually symmetrical on the two sides, the surface is smooth and free from nodules or excrescences, there is very little or no mucous secretion, and no glandular swelling.

Diagnosis.—The history of the gradual onset of the disease and the laryngoscopic appearances are generally sufficient to enable a diagnosis to be made. It requires to be distinguished from laryngoscleroma (rhinoscleroma). In the case of the latter, there is usually a similar affection in the nose, and the detection of the characteristic rhinoscleroma bacilli will clinch the diagnosis. A case which was diagnosed as chronic sub-glottic laryngitis, during life, was found to be one of rhinoscleroma at the necropsy.

Prognosis.—In almost all the cases of marked chronic sub-glottic laryngitis, a grave view must be taken, as the disease shows a decided tendency to advance and to threaten life by suffocation.

Treatment.—In the earliest stage of the disease, the treatment appropriate to the ordinary forms of chronic laryngitis should be tried. Before the disease has advanced beyond the stage of inflammatory hyperplasia, iodide of potassium will be found of great service. The galvano-cautery has been successfully employed in destroying the overgrowth of connective tissue. Sajous recommends chromic acid for the same purpose; he applies it fused on the end of a covered probe. The topical application of lactic acid has also been found useful.

Labus has had good results from flaying the vocal cords when these participate in the hypertrophy. When the increasing growth begins to interfere with breathing, attempts should be made to dilate the narrowing glottis. For this purpose, intubation or Schroetter's tubes should be tried. If dilatation does not succeed, thyrotomy can be performed, and the excess of tissue cut away or destroyed by the cautery, otherwise tracheotomy will have to be performed.

9. CHORDITIS TUBEROSA, "SINGERS' OR TEACHERS' NODULES."

This term has been applied to the occurrence of small, round growths, about the size of a poppy seed, on the vocal cords. Occasionally these growths are longer and more irregular. Mackenzie describes this condition under the head of "Trachoma of the Vocal Cords"; he considers the growth as being due to a partial dermoid metamorphosis of the mucous membrane; in other words, it is an allied condition to pachydermia. Rice regards chorditis tuberosa as a

primary condition, and a cause rather than a result of chronic laryngitis. Although sometimes seen in people who do not use the voice excessively, these small growths are most often met with in singers, public speakers, and those who have much occasion to use the voice. Females are more usually affected than males, and the condition is a very common one in female Board School teachers, amongst whom faulty voice production is of frequent occurrence, their tendency being to make themselves heard by "screaming" or straining the voice at too high a pitch, an evil rendered almost necessary on account of the large classes which are under their care. The growth is usually situated rather more anteriorly than midway between the vocal processes and the anterior insertion of the cord, and it projects from the free margin of the cord. These growths occur more often on the left than on the right cord, and according to Kanthack's observations they represent a local hyperplasia produced by some chronic irritation rather than an inflammatory growth. Holbrook Curtis (N. Y.) thinks that in singers they are often produced by the impact and friction of the cords occurring in the production of the "coup de glotte." The only symptom due to their presence is impairment of the voice, sometimes amounting to hoarseness. In singers there may be only a complaint of inability to "join the registers," showing how slightly the voice is affected in some cases.

Treatment.—All authorities are agreed as to the necessity for rest of the voice, and the more absolute this is, the quicker will the patient recover. The application of external cold to the larynx by means of Leiter's tubes for half an hour every night, and the internal administration of iodide of potassium or the

proto-iodide of mercury have also been recommended. If the growths are large enough they may be removed by forceps or a snap guillotine, but they are often so small that no instrument will deal efficiently with them. Under such circumstances they may be treated with astringent mineral applications, or touched with solid nitrate of silver or chromic acid fused on a laryngeal probe, the application being made at first twice weekly. In professional voice users faulty habits of production must be carefully avoided, and one of us (H. T.) has seen good results ensue from the methodical practice of Curtis' exercises, which are designed to avoid that impact or friction of the cords which he considers one of the main factors in producing the nodules. The essential principle of such exercises is that during phonation the cords do not touch one another, their edges tending to be concave rather than convex.

10. PACHYDERMIA LARYNGIS.

This term was introduced by Virchow as the designation of a peculiar affection of the vocal cords, in which the epithelium takes on an epidermal character, with a corresponding change in the sub-epithelial connective tissue.

Ætiology.—The first point which demands attention is the fact that the disease is one which most often attacks the male sex, occurring most frequently between the ages of thirty-five and fifty-five. The chief exciting cause is chronic laryngitis, due to occupation or some other condition. Tobacco, alcohol, and over-straining of the voice play an important rôle in the production of this disease. Virchow, on the post-mortem table, found

pachydermia especially in drunkards. Sommerbrodt lays great stress on living in a damp dwelling as a cause of the disease.

In discussing this subject we are referring only to idiopathic pachydermia and not to those secondary forms arising in the course of tubercle, syphilis, and malignant disease, to which the term pachydermia is often loosely and incorrectly applied.

Morbid Anatomy and Pathology.—As Virchow pointed out in his original communication on the subject, the essence of the disease consists in the fact that squamous epithelium extends from the pharynx over the inter-arytenoid commissure and along the vocal cords to their anterior extremities. He also pointed out that the squamous epithelium covering these portions of the larynx, as also the epithelial covering of the mouth, pharynx, and œsophagus, possesses a certain approximation to the epidermal covering of the external skin. These dermoid portions of the larynx being unprovided with glands are consequently relatively dry, and do not furnish the abundant secretion so freely poured out in their neighbourhood; in short, they represent a domain of their own. Here processes of a chronic inflammatory nature occur, leading to two kinds of changes. In both forms a large quantity of squamous epithelium is formed, but in one this represents the chief alteration, and the longer it continues the more of an epidermal character does the epithelium assume. The change is limited to isolated, and for the most part very small, spots; this Virchow calls the warty form (*P. verrucosa*). It usually occurs at the anterior extremities of the vocal cords. In the other form (*P. diffusa*) the changes occur chiefly in the mucous membrane proper, and lead to a more diffuse swelling;

hence he terms this the diffuse or smooth form. This variety is almost exclusively met with at the posterior extremities of the vocal cords, in the immediate neighbourhood of the vocal processes. The most characteristic appearance is a long, oval, tumid swelling, frequently from five to eight millimètres long and from three to four broad, seated on the posterior extremity of the vocal cord, which is directed, as a rule, forward and downward from behind and above, so that its anterior end lies under the border of the vocal cord. This tumour may exist on one or both sides of the larynx. If bilateral, there is invariably a depression or pouch on one side, with a corresponding elevation on the other; according to Sommerbrodt, the pouch is always on the left side, but all authorities do not agree with him on this point. The effect of this condition is, that owing to the pouch receiving the elevation, the vocal cords are able to approximate fairly on phonation. The view of the mode of production of the central depression now generally adopted is that first propounded by Fraenkel, who regards it merely as the result of the pressure exercised by the one tumour on the other, when the cords are approximated. Virchow maintains that this depression is due to the intimate connection of the mucous membrane and the cartilage, which exists at that spot. Recently, however (1899), Horne, as the result of the post-mortem examination of a number of larynges, exhibiting various stages of pachydermia, finds that beneath each vocal process there is evidence of cupping and excrescence. By means of microscopic sections this observer shows that in the normal larynx behind and below each vocal process, there exists a line or ridge of epithelium running forward parallel with the cord, the vocal process

forming the point d'appui. With epithelial hyperplasia the normal condition is exaggerated, and a ridge with corresponding furrows is produced upon each vocal process. Horne considers that the appearance of an excrescence on one side and a cupping on the other is due to a "compensatory vertical adaptation" of the cords which assume slightly different planes. Attrition plays no part in this explanation neither does the microscope afford any evidence of the same.

Symptoms.—These will vary somewhat, depending on whether the diffuse or verrucose form exists. If the former, in addition to the ordinary symptoms of laryngeal and pharyngeal catarrh, the patients complain of a feeling of pressure in the throat, sometimes amounting to pain on swallowing. Hoarseness is not a marked symptom. The absence of hoarseness is partly owing to the fact that, in consequence of the pouch on the one side receiving the elevation on the other, there is not much interference with the approximation of the vocal cords. When, however, the pachydermatous change occurs in the inter-arytenoid commissure hoarseness may be a very marked symptom, because the wedge-like character of the growth prevents adduction of the cords. For the same reason dyspnœa upon exertion may be a prominent symptom, and this may be so urgent that (as in a case shown by me (H. T.) at the London Laryngological Society) the question of tracheotomy may have to be considered. In the case referred to, there was also limitation of abduction in both cords, and the whole larynx was congested.

In pachydermia verrucosa the chief symptoms are referable to the voice. On laryngoscopic examination, the warty-like growths will be seen on the anterior part of the cords.

As a result of pachydermia, secondary perichondritic processes may be set up in the arytenoid cartilages, and, on the other hand, Fraenkel saw a scale-like growth (pachydermia) follow upon perichondritis of the arytenoid cartilage.

Diagnosis.—At the commencement there may be some difficulty in distinguishing pachydermia from chronic catarrh of the larynx. Later on, the laryngoscopic picture is so characteristic that, once having been recognised, the diagnosis of a similar case is easy. The bilateral, peculiar change in the neighbourhood of the vocal process, the shell-like depression on one side, with the rounded swelling on the other, fitting into this depression on phonation, present a combination not met with in any other laryngeal affection. The induration of the posterior laryngeal wall, sometimes met with in pachydermia, might be confounded with tuberculosis. As against carcinoma the bilateral nature of the affection in pachydermia is of diagnostic value, but where the inter-arytenoid region and the vocal processes are affected, and there is impaired mobility of the cords, the diagnosis between these conditions may be exceedingly difficult.

When, however, the disease is unilateral the mobility of the cord would favour benign rather than malignant disease.

Prognosis.—The outlook, as regards life, is almost invariably good. The disease runs a very chronic course, and although complete resorption of the growth very seldom, if ever, takes place, the recovery of a fairly good voice may be expected. There is no evidence to show that pachydermia tends to undergo a malignant transformation.

Treatment.—The first thing to be done is to re

move, if possible, the exciting causes of the disease; hence, all sources of local irritation should be attended to, especially those caused by alcohol and tobacco. Amongst other things, rest of the voice should be enjoined and combined with the external application of cold (*vide* "chorditis tuberosa"). Internally, most authorities recommend the use of iodide of potassium in moderate doses; alkaline and sulphurous waters, such as those of Ems and Weilbach, are often beneficial. The best local applications are dilute solutions of lactic acid or iodine, and considering the hypertrophy of epithelium in these cases, solutions of salicylic acid in absolute alcohol from 5 to 15 per cent. should be used. Cutting forceps may be used if the growths are large or suitably situated for removal. Chiari strongly recommends electrolysis when the growth is situated upon the vocal cord, the strength of the current being from 10 to 12 milliampères used for 3 to 5 minutes at a time.

Scheinmann advises steam inhalations of a 2 to 3 per cent. solution of acetic acid for ten minutes, three times daily for some weeks. Watson Williams has seen improvement from a laryngeal spray of tincture of thuja occidentalis (1 in 10) combined with internal administration of proto-iodide of mercury gr. $\frac{1}{10}$. Others recommend the use of the galvano-cautery, but it must be used in the larynx with the very greatest care.

11. ŒDEMA OF THE LARYNX.

The term "œdema of the glottis" is a misnomer; the glottis is a *space*, and cannot, therefore, become œdematous.

By œdema of the larynx is meant a serous or sero-purulent infiltration of the connective tissue of the larynx in general and of the ary-epiglottic folds in particular.

Ætiology.—Two forms of the disease have been described, viz., primary and secondary. The first may come on quite suddenly, and may occur in persons previously healthy. It may be divided into (*a*) simple œdema, such as that resulting from traumatism of foreign bodies, injuries, caustics; the result of a chill or over use of the voice, and that curious form of œdema which arises in some people after the administration of iodide of potassium. The action of this drug in producing œdema of the larynx must be attributed solely to the idiosyncrasy of the individual, as robust and delicate persons seem equally affected. The effect may come on after comparatively small doses, and after a short period of administration. Other symptoms of iodism, such as headache, are absent. The iodide has a purely local action, and does not give rise to a general œdema. The iodine, and not the potassium, is the active agent in causing this symptom, and it cannot be ascribed to any impurity in the drug. Poisoning by this drug is best avoided by beginning with small doses and gradually increasing; the combination of belladonna with the iodide is said to prevent its toxic action. Struebing describes a form of œdema of the larynx co-existing with a similar condition of the pharynx and skin, which he, in the absence of any inflammatory cause, regards as being due to angio-neurosis. It commences with hyperæmia, which is quickly followed by an intense œdema; albuminuria does not occur. Some observers assert that non-traumatic œdema is always the result of erysipelas. In reference to this point, Semon

writes :—"Idiopathic, primary, acute œdema of the larynx is excessively rare." According to Sestier's excellent statistics on œdema of the larynx, simple inflammation was the cause of œdema in about only six per cent. of all his cases. And Dr. Morell Mackenzie believed that in nearly all these instances of so-called simple inflammation, the disease was due to blood-poisoning. (*b*) Infectious or septic forms, which have already been dealt with under "Acute Septic Inflammation of Pharynx and Larynx," p. 354.

Secondary œdema may also be sub-divided into : (*a*) local, as a complication of certain chronic diseases of the larynx, such as carcinoma, syphilis and tubercle. Quinsy is occasionally fatal through this complication. It may occur in the course of infectious diseases, such as small-pox, measles, diphtheria, mumps, scarlet fever, and several cases have been recorded as occurring in influenza, one of which was so urgent as to necessitate tracheotomy. Even an apparently slight inflammatory attack may lead to œdema of the larynx, and a rapidly fatal case of this nature has been reported. (*b*) General causes, such as the passive congestion in heart and lung affections, *e.g.*, emphysema, or the pressure of an aneurysm on the large venous trunks.

It may accompany certain diseases of the skin, such as lupus, leprosy or herpes.

The connection of œdema of the larynx with Bright's disease still remains a disputed point. Neither Morell Mackenzie nor George Johnson, with their large experiences, had ever noted any relationship between the two diseases. On the other hand Gibb, Peltesohn, and others, have found a distinct connection between the two conditions, and the explanation of this occurrence of œdema of the larynx in the course of Bright's disease

may be due to the fact, that an irritation too slight to cause œdema of the larynx in a healthy individual, may suffice to bring it about in an albuminuric patient.

Œdema of the larynx has also been met with in diabetic and myxœdematous patients, and has been known to cause death in the new-born infant. Bayer has pointed out that attacks of œdema of the larynx may correspond with the catamenial period, and cites this fact as an example of the relationship existing between the female genital organs and the vocal apparatus.

Morbid Anatomy and Pathology.—The character of the effusion into the sub-mucous connective tissue varies much. It may be simply serous, or sero-fibrinous, with or without cell infiltration, or it may be sero-purulent or even bloody. The consistence of the swelling varies with the nature of the exudation, being softest in the serous variety. The more chronic the œdema, the greater is the cell proliferation. Gougenheim describes two kinds of œdema, true and false. He points out that the infiltration of the ary-epiglottic folds in tuberculosis of the larynx is tuberculous in nature, and not a true œdema, such as is met with in caries of the laryngeal cartilages. A true œdema of the larynx, viz., a purely serous exudation into the connective tissue of the larynx, is comparatively rare; what is generally called œdema is of a more or less inflammatory nature.

The amount of swelling depends upon the amount of sub-mucous connective tissue, and upon the more or less firm adhesion of the mucous membrane to the underlying tissues. Inasmuch as the sub-mucous tissue is least abundant on the vocal cords, they suffer least of all from œdema, but occasionally it is limited to the part below the level of the cords, constituting the sub-

glottic variety; the œdema due to iodide of potassium sometimes occurs in this situation. On the other hand, the mucous membrane over the ary-epiglottic folds being loosely attached to the sub-glottic tissues, these folds very readily become œdematous. Struebing's angio-neurotic œdema depends upon an increased irritability of the vaso-dilator nerves. In cases of secondary œdema, it may commence in the mouth and pass along the pharynx to the larynx.

Symptoms.—One of the first symptoms complained of is the feeling as if a foreign body were present in the throat. There may also be pain and difficulty in swallowing, especially when the epiglottis is much swollen, resulting in an accumulation of saliva in the lower part of the pharynx. Owing to imperfect closure of the glottis, there is a tendency to choke when fluids are taken. Difficulty in breathing, which may increase with such rapidity as to threaten life in two or three hours, is a very characteristic symptom of œdema of the larynx. The voice also becomes weak, or may be entirely lost.

On laryngoscopic examination, the epiglottis may be found to be erect, tense, enormously swollen, and nearly touching the back of the tongue; it is usually of a bright red colour. The ary-epiglottic folds are frequently obscured by the swollen epiglottis, but, if they can be seen, they form plum-like bodies, and may nearly meet in the middle line. In those rare cases in which the œdema is confined to the connective tissue below the cords, red, fleshy swellings may be seen bulging from beneath the cords. In the absence of the laryngoscope, the swollen condition of the epiglottis and ary-epiglottic folds may be recognised on making a digital examination.

Diagnosis.—If a laryngoscopic view can be obtained, the diagnosis is easy; in its absence, it is at times impossible to state with certainty the cause of the obstruction.

Prognosis.—The prognosis is always grave, except in the cases in which the œdema is limited in character; and even in these rapid extension may occur. If, in addition to the ary-epiglottic folds, other parts of the laryngeal mucous membrane are also affected, there is great danger of suffocation. Œdema due to caries of the cricoid cartilage, causing obstruction below the glottis, is eminently dangerous. Over and above the risk attending the blocking of the larynx from the swollen condition of the mucous membrane, the possibility of the occurrence of spasm of the glottis should be borne in mind.

Treatment.—The patient should be put to bed, kept absolutely quiet, and strictly enjoined not to speak. The food should be soft, liquid, and cold, so as to prevent any injury to the swollen parts. If there be marked dysphagia, feeding the patient, per rectum, will materially assist in promoting recovery.

Pellets of ice to suck, and an ice-bag applied to the outside of the larynx, are to be preferred to warmth. In order to diminish the tendency to spasm of the glottis, and as well as for its general sedative effect, bromide of potassium, in 10- to 20-grain doses every two or three hours, will be useful. Pilocarpine $\frac{1}{8}$ grain as a subcutaneous injection, every twenty minutes for three doses, has had an excellent effect, the patient feeling quite comfortable a quarter of an hour after the last injection.

Free scarification will often give immediate relief. Mackenzie's guarded laryngeal lancet is the best in-

strument for the purpose (fig. 60). The application of a 20 per cent. solution of cocaine (formula No. 49), either in the form of spray or by the brush, to the larynx, will facilitate the operation, and may even itself suffice to put the patient out of immediate danger. If these instruments are not at hand a curved bistoury, protected to within an inch of its probe-pointed end, may be used and guided downwards to the swollen parts by means of the index finger of the other hand.

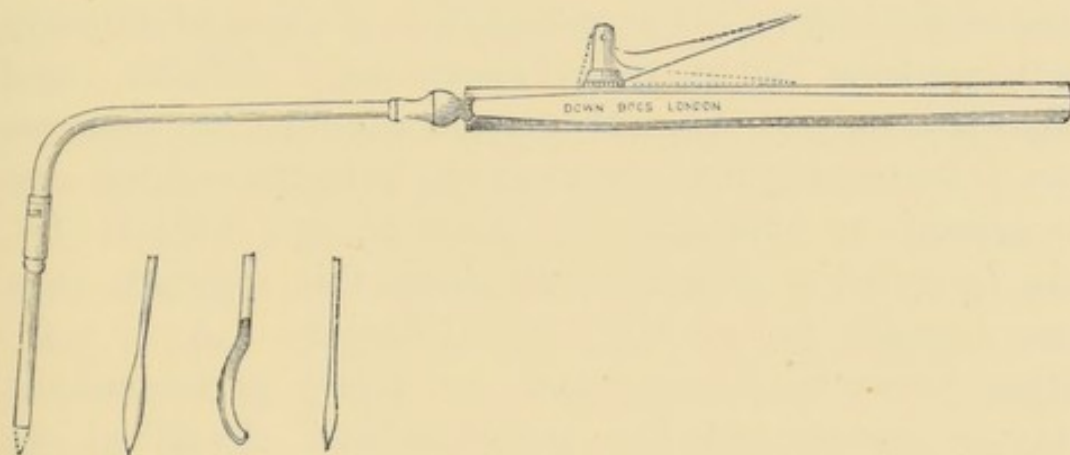


Fig. 60.—Mackenzie's Laryngeal Lancet.

If other measures fail, intubation may be tried, but, on account of the great swelling of the parts round the glottis in these cases, it is rarely successful, so that in the end we have to fall back upon tracheotomy. This operation should not be delayed until the patient is *in extremis*, but should be performed immediately after the first attack of suffocation occurs. It is well to open the trachea as low as possible lest any infra-glottic œdema should accompany the laryngeal swelling.

12. PERICHONDritis OF THE LARYNX.

Inflammation of the perichondrium of the larynx. This may undergo partial or complete resolution; in

more severe cases, necrosis and detachment of a part or the whole of the affected cartilage may occur.

Ætiology.—The affection may be primary, but it is almost invariably secondary to some other laryngeal disease. The term “primary perichondritis” should be restricted to cases in which inflammation of the perichondrium occurs as the result of catarrh, or even possibly from sudden and violent over-use of the voice, or other indefinable causes, without any previous affection of the larynx. The recognition of cases of primary perichondritis is at times exceedingly difficult, and often it is only at the post-mortem examination that one can definitely say that the case was primary and not due to syphilis or tuberculosis. One of us (F. de H. H.) has recorded a striking example of this difficulty in a case brought before the Clinical Society. As a transition between primary and secondary perichondritis may be mentioned the perichondritis described by Dittrich, as due to “decubitus, in consequence of the pressure of the cricoid cartilage, particularly if ossified, upon the soft parts in front of the vertebral column.” Gerhardt has described two cases of cricoid perichondritis, caused by decubitus in patients with disease of the vertebræ, with forward curvature of the cervical spine. The causes of secondary perichondritis are traumatism, *e.g.*, blows, gun-shot wounds, stabs, and other injuries; tuberculosis; syphilis; malignant disease; septic inflammation; acute and chronic infectious diseases, especially typhus and typhoid fevers.

Morbid Anatomy and Pathology.—The pathology of primary perichondritis of the larynx, followed by necrosis of cartilage, is involved in difficulty. How the suppuration is brought about does not admit of any very ready explanation; it is not consistent with the

views at present held on the pathology of inflammation, to assume that an abscess may form without local injury or septic infection. "In cases of perichondritis following upon syphilitic, tubercular, or carcinomatous ulceration, the morbid process is easily studied. Septic or specific micro-organisms penetrate the perichondrium from the mucous or ulcerated surface of the larynx, and there set up inflammatory changes, at first characterised by thickening of the fibrous tissue of the perichondrium, and followed by the formation of pus, which accumulates so as to dissect from the cartilage its source of nutrition, in the same way as, in necrosis of bone, the periosteum is separated, and leads to death of the part. The morbid process is generally confined to one cartilage—the cricoid—to begin with, but it may, in severe cases, extend to others. As the pus accumulates, the perichondrium softens and ruptures, and the inflammation spreads to the surrounding parts through which the pus burrows, and, according to the situation of the disease, an abscess may rupture into the œsophagus, pharynx, larynx, or trachea, or it may discharge externally and produce a laryngeal fistula. The dead or necrosed cartilage becomes eroded, and is slowly separated from the living. When complete exfoliation has taken place, the abscess collapses, and, as a rule, leads to great deformity of the larynx." (Newman).

As regards the occurrence of laryngeal perichondritis in enteric fever, there can be no doubt that this complication is less frequently met with in this country than on the Continent, where out of 1,745 post-mortem examinations in enteric fever, laryngeal complications were found in 17 per cent. Ziemssen is in favour of the decubital origin of the typhoid perichondritis, and this view is supported by the record of eight

cases at Tiflis. In these the perichondritis came on five to ten weeks after the commencement of enteric fever, and in all without pain. This certainly looks like a condition brought about by defective nutrition in a very debilitated patient, rather than by any specific inflammatory process, and there is ground for believing that, in some cases, at all events, the inflammation originates in the perichondrium, and is not the result of extension of typhoid ulceration down to the cartilages. Moreover, since perichondritis may occur during convalescence from other exhausting zymotic diseases we can scarcely regard it as a specific result, but more in the nature of a sequela, although this view is not held by Koch, who asserts that the ulceration of the larynx is a true laryngo-typhoid state coinciding with the acute period of the general disease, and which later on may lead to stenosis.

Inflammation, occurring in connection with the arytenoids or the cricoid cartilage, is very apt to produce mechanical fixation of the crico-arytenoid joint, with corresponding immobility of the vocal cord of the same side (*vide* page 431).

Symptoms.—In primary perichondritis, the first symptom to suggest that the perichondrium is affected, is a dull, aching pain, which is increased upon pressure over the larynx. This may be accompanied by slight febrile symptoms and malaise. Dysphagia and more or less odynphagia are usually present, especially if, as is generally the case, the cricoid cartilage be implicated. Cough and hoarseness are almost constant symptoms, and there is dyspnoea in proportion to the degree of obstruction, whether this is induced by swelling of the soft parts or mechanical fixation of the cords. If one cord only is fixed, and (as is usual) in the adducted posi-

tion, the dyspnœa may be slight, and the voice little altered. If, however, both vocal cords are mechanically fixed in adduction, the dyspnœa is extreme, although the voice may be little altered.

At an early stage, laryngoscopic examination may disclose only some swelling of the mucous membrane, and perhaps immobility of one vocal cord. Even when an abscess forms, it is difficult to determine whether or not the perichondrium is affected, unless portions of cartilage be expectorated, or a rough area of necrosis be detected by the aid of the laryngeal probe. Perichondritis may simulate acute œdema of the larynx in its onset. When the cricoid cartilage is primarily implicated an infra-glottic swelling is generally to be seen.

In secondary perichondritis, the symptoms are often so masked by those of the primary disease, that a diagnosis is impossible until portions of cartilage have been expectorated, or until perchance an attack of dyspnœa has resulted from the cartilage, suddenly dislodged, becoming impacted in the glottis. In other respects the symptoms are much the same as those mentioned as occurring in primary perichondritis.

Syphilitic perichondritis is, however, not attended by much pain. There is usually early enlargement of the cervical lymphatic glands, and swelling over and around the larynx, which will be found to be tender on palpation, and crepitus may be detected. The cough is attended with expectoration of a muco-purulent matter, which is sometimes very offensive; the breath in these cases will be foetid.

In the later stages of the disease, when sinuses connected with the abscess cavity have formed and opened externally, or into the œsophagus, the patient presents a miserable aspect, and may die worn out by the

exhausting nature of the discharge, pain and want of sleep.

The causes of laryngeal obstruction in perichondritis may be arranged under the following heads: œdema; immobility of one or of both vocal cords; swelling, due to the formation of an abscess; impaction of a portion of necrosed cartilage in the glottis; collapse of the cartilaginous wall of the larynx; and finally, in the more chronic cases, the cicatrisation which follows the healing of the ulceration, this latter result is almost entirely confined to the syphilitic cases.

Diagnosis.—The diagnosis of primary laryngeal perichondritis is a matter of great difficulty. In the first place, it is often impossible to exclude a constitutional origin of the affection; and secondly, unless there be extrusion of a portion of the cartilage, or bare cartilage can be detected by the probe, it is hard to say whether the swelling seen with the laryngoscope is simply in the mucous membrane, or whether the cartilage is also affected. Moreover, crepitus given by loose or necrosed cartilage may be very closely simulated by a similar feeling which can often be felt, especially in thin individuals, if the larynx is moved transversely across the front of the vertebral column.

In secondary perichondritis, the question of the cause is often one which will baffle the keenest diagnostician. In phthisical cases, the arytenoid cartilages are particularly liable to be affected. A very common site of tuberculous ulcers is the inter-arytenoid fold, or they may be seen on the anterior aspect of the arytenoid cartilages. These ulcers are often very small in circumference, but, penetrating deeply, they lay bare the cartilage. The general pallor of the pharynx and larynx, and the puffy swelling of the epiglottis and

arytenoid cartilages, will often assist in making the diagnosis, and if tubercle bacilli are found in the secretion removed from the surface of the ulcer by the laryngeal brush, it hardly requires the corroboration of pulmonary mischief to clinch the diagnosis.

In syphilitic perichondritis, the congested appearance of the larynx is in marked contrast with the pallor of tuberculous disease. Syphilitic perichondritis is characterised by the absence of pain, and the fact that in many cases the mischief has extended from, or is complicated with, ulceration of the pharynx; and there is possibly the history of past syphilitic manifestations. It is important to remember that a tuberculous affection may become engrafted on a syphilitic basis.

But it is in the diagnosis of perichondritis arising from cancer that the greatest difficulties arise and the most painful mistakes are made. A thickened and infiltrated condition of the thyroid and cricoid cartilages and of the surrounding tissues, with mechanical fixation of one cord, and the occurrence of hæmorrhage from the larynx, are very suggestive of malignant disease; but all these conditions may be found in perichondritis of syphilitic or tuberculous origin. Abscess, in the case of cancer of the larynx, is rare, and the enlarged cervical glands met with in this disease very rarely suppurate.

In making a diagnosis, the importance of the effect of treatment should be borne in mind. Hence, in all doubtful cases, an anti-syphilitic treatment should be instituted and thoroughly carried out. Temporary improvement does not warrant the diagnosis of syphilis, as many cases of malignant disease are benefited by the administration of iodide of potassium.

Prognosis.—From what has been already stated it

will be inferred that the prospects of a patient affected with perichondritis are very gloomy. In the rare instances in which the disease is primary and of limited extent, recovery may occur, but in these cases possibly not until after tracheotomy has been performed, and it may be necessary for the patient to wear the cannula for the remainder of his life. Even if tracheotomy can be avoided, much damage is generally done to the delicate mechanism of the larynx, particularly to the crico-arytenoid joint, leading to ankylosis and consequent fixation of the cord. In secondary perichondritis, the traumatic and syphilitic varieties are the most hopeful, but, as already mentioned, the healing of syphilitic ulceration is generally accompanied by stenosis, due to the formation of fibroid tissue, and, as we shall see, treatment by dilatation leaves much to be desired.

Statistics show that laryngeal stenosis following enteric fever, whether tracheotomy has been performed or not, is a very grave condition.

Treatment.—At the commencement, and especially in cases of primary perichondritis, an attempt should be made to check the inflammatory process by keeping the patient in the recumbent position and forbidding him to talk, so as to ensure functional rest as far as possible. Cold should be applied externally by means of the ice-bag or Leiter's coil, and the patient should be instructed to swallow pellets of ice. Leeches applied to the throat are sometimes useful. If there be pain or tenderness, the administration of opium, in combination with small doses of tincture of aconite or antimonial wine, is indicated. Iodide of potassium, in rapidly increasing doses, should be given in all cases. Even when no syphilitic taint is present, this drug often

benefits the patient considerably. In cases of syphilitic origin, the inunction of blue ointment may be employed in addition to the iodide. If symptoms of laryngeal stenosis come on, a twenty per cent. solution of cocaine should be painted over the mucous membrane of the larynx; this may succeed in causing contraction of the swollen parts, and if this does not in itself relieve the dyspnœa, the cocaine will facilitate the use of the scarifier in cases of œdema, or of the laryngeal lancet if there be evidences of the presence of pus. Suppuration may be favoured by poultices and by warm and sedative inhalations. The possibility of suffocation suddenly occurring from the separation of a piece of necrosed cartilage, and its impaction in the glottis, should be borne in mind, and if loose cartilage be felt it should be removed, if possible, by means of forceps. Should a severe attack of dyspnœa have occurred, tracheotomy must be performed before time has elapsed to cause the morbid changes in the lungs due to obstruction in the upper air passages.

Unfortunately, when once tracheotomy has been performed, we are confronted with the difficulty of removing the cannula in those cases in which death has not occurred from exhaustion. Schroetter claims brilliant results for his plan of dilatation, but in this country, so far as we know, no cases of permanent success of dilatation of a stenosed larynx, as the result of perichondritis, have been recorded.

When urgent dyspnœa has been overcome by tracheotomy, it is generally agreed that thyrotomy or laryngofissure is good practice in that, by its means, we are enabled to remove pieces of necrosed cartilage, thus lessening or completely checking a suppurative process damaging to the patient's health and liable at any time

to set up septic lung inflammation. At the same time the surgeon is enabled to dissect away cicatricial obstructing bands, the absence of which may enable the patient to discard the tracheotomy tube altogether.

In cases in which radical treatment is not deemed advisable, it may be necessary, after tracheotomy has been performed, to feed the patient by a soft rubber œsophageal tube or by the rectum.

13. ABSCESS OF THE LARYNX.

As a rule, abscess of the larynx is met with as a result of erysipelatous inflammation of the larynx (see p. 358), or in connection with perichondritis (see p. 423). Very occasionally, however, it may be of idiopathic origin; that is to say, no distinct cause is recognisable. Traumatism is the probable explanation of these cases.

Should inflammation of the larynx go on to suppuration, the abscess may point, and the yellow colour of the pus may be detected laryngoscopically.

Treatment.—As soon as the presence of suppuration is diagnosed, the abscess, if small, may be opened with the laryngeal lancet (fig. 60, p. 419) the parts having previously been anæsthetised with cocaine. If the abscess be very large, it may be necessary to perform tracheotomy, and plug the trachea before the abscess is opened.

14. AFFECTIONS OF THE CRICO-ARYTENOID ARTICULATION.

Under this heading will be discussed inflammation of the crico-arytenoid joints; the result of this process, viz, ankylosis of the crico-arytenoid articulation; and luxation of the cartilage.

Crico-Arytenoid Arthritis.

Inflammation of the crico-arytenoid joints has been found to be of much more frequent occurrence than was at one time suspected.

Ætiology.—In the acute form, crico-arytenoid arthritis may be due to thermic, chemical, and mechanical causes, acting upon the larynx. Among the mechanical causes may be mentioned external blows, penetrating wounds, swallowing hard and sharp substances, and the unskilful use of the laryngeal forceps. Acute inflammation of the joint has been described as the result of rheumatic and gouty attacks, tonsillitis, typhoid fever, measles, diphtheria, scarlatina, bronchitis, and other acute disorders.

The most common cause, however, is cold, especially if combined with over-use of the voice in the open air, and particularly if at the same time the individual should be only recently convalescent from an acute disease, such as influenza.

In the chronic forms, the disease generally results from syphilis, cancer, tuberculosis, or lupus of the larynx.

Morbid Anatomy and Pathology.—So little attention has been paid to the condition of this small joint, that nothing very definite is known as to the changes which take place in inflammation: but it is unlikely that they differ from the changes met with in other inflamed joints.

Symptoms.—Pain in the throat, and tenderness over the affected side, dysphagia with or without odynphagia, dyspnœa and hoarseness, are the symptoms met with in varying degree. If both arytenoid joints

are affected, the symptoms will, of course, be more marked, but generally the affection has been unilateral. On laryngoscopic examination, there is usually some amount of thickening, or swelling, to be detected around the joint. If the case be seen at the commencement, the mucous membrane over the joint will be found red and swollen. The appearances will vary according as the arytenoid is fixed in adduction or abduction.

Diagnosis.—If the case be acute, and the patient be seen early, there is not usually much difficulty in making a diagnosis. The sudden onset of the symptoms following upon a cause known to be capable of producing the arthritis, the swelling round the joint, and the fixed position of the cord, are very characteristic. The difficulty in diagnosis comes at a later stage, when the acute symptoms have passed by and we have to deal with a condition of ankylosis; but this question will be discussed in the next section.

Prognosis.—Early and prompt treatment will often prevent permanent damage to the voice, but, when once the stage of ankylosis has been reached, the only hope of improvement in the voice consists in the possibility of over-action in the sound vocal cord, whereby it transgresses the median line, and so comes more into apposition with the fixed cord. Cartaz points out that a crico-arytenoid arthritis and a consecutive ankylosis may be the first manifestations of laryngeal tuberculosis.

Treatment.—The treatment at first is the same as for primary perichondritis (*q.v.*). In two cases in which the disease was bilateral and associated with considerable inflammatory swelling of the arytenoid and aryepiglottic folds, one of us (H. T.) had to perform tracheotomy in order to relieve the urgent dyspnœa.

In both patients the voice remains good, but in each the tracheotomy tube has still to be worn although it is seven and four years respectively since the operation was performed. Later on, external inunction of the red iodide of mercury ointment over the affected part, the use of electricity—both the galvanic and the faradic current—the application of astringents, and the administration of iodide of potassium, should be tried.

Ankylosis of the Crico-Arytenoid Joints.

Every form of stiffness of the crico-arytenoid articulation, which is produced by mechanical causes, is called an ankylosis of this joint. There are two forms, viz., *true* ankylosis, in which the stiffness is produced by intra-capsular disease, and *false* ankylosis, in which extra-capsular changes lead to mechanical impairment of the functions of the joint. In some cases, true ankylosis is a consequence of a long-existing false ankylosis.

By luxation of the crico-arytenoid articulation is meant a displacement of the arytenoid cartilage from the articular surface of the cricoid; in some cases, both ankylosis and luxation are present simultaneously.

Ætiology.—Inasmuch as true ankylosis is brought about by changes taking place in the joint itself, the cause of this condition is manifestly due to an inflammation of the joint, however slow and insidious this may be; hence, the causes of *true* ankylosis are those which produce arthritis. Semon points out that “besides the, no doubt, *more frequent* suppurative form, another and more chronic form, *the adhesive*,” may exist, “in which, without any free exudation between the inner layer of the perichondrium and the cartilage, the affected part becomes considerably thickened in conse-

quence of inflammatory new formation of dense connective tissue." *False* ankylosis is due to cicatricial contraction of the mucous membrane, or of the muscles after injuries, typhoid, syphilitic, and other kinds of ulceration. It is possible, also, that ankylosis may occur as the result of the forced inactivity of the arytenoid cartilage—as, for example, in cases of pressure on the recurrent laryngeal nerve, complete stenosis of the lower part of the larynx, &c.

Morbid Anatomy and Pathology.—In some cases there is simply roughness of the joint; in others, the articular surfaces are firmly adherent. If suppuration has occurred, there will, of course, be more or less destruction in the joint from caries or necrosis. In syphilitic affections, the most noticeable feature is the amount of fibrous tissue developed in and about the joint. In gouty cases, deposits of urate of sodium occur. In false ankylosis, the changes consist chiefly in the formation of cicatricial tissue in the muscles and mucous membrane.

Symptoms.—The symptoms of ankylosis of the crico-arytenoid joint will depend upon whether the affection is unilateral or bilateral, upon the position in which the cord or cords are fixed, and upon the amount of swelling of the cartilage. Hence, there may be all degrees of dyspnœa, from shortness of breath on exertion, up to a condition demanding the prompt performance of tracheotomy. The voice also varies very much; there is usually hoarseness, but it is not a necessary accompaniment. In some cases there is compensatory action of the unaffected cord, which permits of approximation of the cords, and of a fair voice. If the cords are fixed in the phonatory position, the dyspnœa will be very great, but the voice may be

natural, or have a falsetto character should there be luxation of the arytenoid cartilages and increased tension of the cords.

On laryngoscopic examination, the joint may be found fixed in any position; in syphilitic cases, attended with cicatricial contraction, it may even be drawn over the median line; usually, however, it is fixed between the cadaveric and phonatory positions. In the majority of cases, there is swelling of the arytenoid cartilage and some tumefaction over the joint. In false ankylosis, there may be no swelling at all. In cases in which ankylosis is combined with luxation, the relative position of the surfaces of the arytenoid cartilage may be altered, so that parts of it come into view which are not seen under normal conditions, and, on the other hand, parts usually to be seen are now concealed from view, and some of the mucous folds attached to the cartilages are lax and the others are tense.

Diagnosis.—If one, or both, vocal cords be found immobile, the presumption is in favour of this being the result of paralysis. In cases in which there is no apparent cause for paralysis, and in which there is a history of symptoms pointing to some inflammatory affection of the throat, the possibility of ankylosis should be entertained. For confirmatory evidence, the presence of tumefaction about the joint, absolute immobility of the cartilage, and the signs of previous ulceration should be looked for. Percy Kidd has directed attention to a "peculiar obstructive form of laryngeal tuberculosis which simulates bilateral abductor paralysis." In the cases he observed, though the cords lay close together, as in bilateral paralysis, their movements to and from the median line were almost equally impaired. But in all his cases, as also in one

under the author's (F. de H. H.) care, laryngoscopic examination revealed the presence of some alteration in the neighbourhood of the arytenoid cartilages.

Prognosis.—Where the cords are fixed near the middle line, or where there is great swelling of one arytenoid and corresponding ary-epiglottic fold, death may threaten unless tracheotomy be performed in time. As regards the question of voice, this will depend upon the duration of the symptoms. The prognosis is better in false than in true ankylosis, and in the traumatic form rather than the perichondritic. One factor in causing improvement in the voice is the compensatory action of the unaffected cord.

Treatment.—In recent cases, especially of a simple inflammatory or syphilitic nature, iodide of potassium in gradually increasing doses should be tried, and iodine ointment or the red iodide of mercury ointment rubbed in externally over the affected part. In the early stages, the treatment of ankylosis is that of the arthritis on which it usually depends, and in the later stages stenosis is the prominent symptom which requires to be treated. The treatment of stenosis, from whatever cause arising, will be found at p. 486.*

15. NON-MALIGNANT NEW GROWTHS OF THE LARYNX.

Growths of an innocent character, projecting from the mucous membrane of the larynx.

* This section is for the most part an abstract of Semon's admirable and exhaustive article on "Mechanical impairments of the functions of the crico-arytenoid articulation," which appeared in the *Medical Times and Gazette*, vol. ii., 1880.

Ætiology.—All the growths met with in other organs of the body may have their counterpart in the larynx. According to Morell Mackenzie, papillomata are by far the most frequent, fibromata come next in frequency and finally cystomata. The remaining growths, such as myxomata, adenomata, lipomata, angiomas, cartilaginous and mixed tumours, are comparatively rare.

We have no certain knowledge as to the cause of these benign growths, although chronic laryngitis has been said to be a precursor, but trustworthy evidence of this is not forthcoming. The fact that over-use or wrong use of the voice seems a strong predisposing, if not exciting cause of such conditions as “singers’ nodes” or “teachers’ nodules” would seem to point to irritation, and the accompanying congestion as being, at any rate, a strong predisposing cause of the formation of benign growths in the larynx.

Males are more commonly affected with laryngeal growths than females. Papillomata not infrequently occur in childhood; fibromata, on the other hand, are almost exclusively met with in adults. Congenital growths are occasionally seen.

Tumours developing late in life, *i.e.*, after the fiftieth year, should suggest the probability that they are of a malignant nature.

Morbid Anatomy and Pathology.—Papillomata are composed of a basis of connective tissue supporting blood-vessels, and covered with epithelium. Growing generally from the vocal cords they may be sessile or pedunculated, and either single or multiple, and in the latter case they may also be found growing from the ventricular bands. They often present a cauliflower-like appearance. Papillomata are generally of a pinkish

colour, but they may be greyish or white. Virchow has applied the term "*pachydermia verrucosa*" to this form of growth (see p. 409). They very rarely grow from the inter-arytenoid fold, and thus differ from the granulation masses often seen in this situation in tuberculous and syphilitic laryngitis.

Fibromata consist of firm, dense, fibrous tissue, and are sometimes fairly vascular, especially the sessile variety. The surface is usually smooth, and the colour varies from white to pink. When growing on a vocal cord, a fibroma can often only be recognised by its shape, as in colour it is indistinguishable from the cord. Fibromata may be sessile or pedunculated, and are usually oval or round.

Cysts generally spring from the epiglottis, or from the laryngeal ventricles, and vary in size from a pin's head to a bantam's egg. They may be classed among retention cysts. In appearance they are semi-translucent, smooth and of a pinkish colour.

Of the remaining tumours met with in the larynx, it is sufficient to say that they differ pathologically in no respect from similar growths found in other organs. The angiomata may occur in any part of the larynx or on the epiglottis, and may generally be recognised by their purple-bluish colour.

Intra-laryngeal growths occur in connection with syphilis and tuberculosis of the larynx; they will be discussed under these headings. It has been suggested that syphilis has some influence in promoting the formation of neoplasms of a non-specific nature, but this is extremely doubtful.

Symptoms.—The symptom which is most commonly complained of is some alteration in the voice. This may vary from slight hoarseness up to complete

aphonia. The degree of loss of voice does not depend upon the size of the growth: a small sessile tumour will often cause much greater hoarseness than a larger tumour, which, by being pedunculated, does not interfere with the vibration of the cord to the same extent. Should the pedicle be long, and the polypus freely movable in the respiratory current, the condition of the voice will vary greatly, according to the condition of the polypus; at one moment the patient may be able to speak in a natural voice; at the next, he may be almost aphonic, on account of the growth being caught between the cords. Cough is not a constant symptom, although an exception must be made to this in the case of papillomata in children. Angiomata occasionally give rise to hæmorrhage, which may be mistaken for hæmoptysis. Dyspnœa depends on the size and the position of the growth. For example, tumours springing from the margin of the glottis are much more likely to cause dyspnœa, than those originating from the epiglottis and consequently obstructing the air-passage less. Dysphagia is only met with in cases where, on account of the size of the growth, there is some mechanical interference with the act of swallowing, or when it is seated on the epiglottis. Pain is almost invariably absent.

Diagnosis.—This is usually to be effected by means of the laryngoscope, and may be confirmed by the microscopic examination of portions of the growth expectorated by the patient or removed by the surgeon.

The diagnosis of laryngeal cysts is usually comparatively easy; the opaline tint and the smooth, tense, rounded nature of the tumour at once suggest its character. On the other hand, blood cysts are very difficult of recognition. Certain cysts, especially when

small, are liable to be mistaken for œdema and tuberculous infiltration of the arytenoids. The diagnosis from prolapse of the ventricle is given at page 501.

The diagnosis between malignant and non-malignant growths is discussed under the former heading. The condylomata of secondary syphilis are to be distinguished by the rapidity with which they disappear under treatment. Gummata and the excrescences met with in tertiary syphilis might possibly mislead; but attention to the general condition of the larynx, and the help furnished by constitutional symptoms, should prevent error. The same holds good in the case of tuberculous infiltration and tumours. But the possibility of the co-existence of tertiary syphilis or phthisis, and an independent papilloma, or other growths in the larynx, should be remembered. In a case of phthisis with hoarseness observed by one of us (F. de H. H.) the appearances were at first those of chronic laryngitis with thickening of the left vocal cord, and were compatible with the diagnosis of laryngeal tuberculosis, secondary to pulmonary phthisis. After an interval of three years, a growth of the size of a small cherry was found attached to one of the vocal cords, occupying about two-thirds of its length. The results of treatment proved that the laryngeal condition was quite unconnected with that of the lungs.

Gougenheim and Tissier have described a special form of laryngeal tuberculosis which they call "pseudo-polypoid phthisis," which is characterised by the occurrence of growths situated in the inter-arytenoid commissure and on the vocal cords.

Prognosis.—This has to be considered with regard to (1) the danger to life and (2) the state of the voice. The danger to life is comparatively small, as, even in

those rare cases in which the growth cannot be removed *per vias naturales*, there is always the possibility of recourse to tracheotomy; and if this operation be not unduly postponed, the risk to life is small. Semon points out that as a general rule the tendency of benign laryngeal growths is to gradually increase in size, but papillomata sometimes do so rapidly. Death has, however, followed from hæmorrhage after the removal of a laryngeal polypus, as in a case of Gruenwald's.

As regards the voice, greater caution is needed in expressing an opinion. In some cases the growth may remain stationary and give rise to very little or no inconvenience. A distinguished singer, who had a sessile growth (probably a fibroma) seated on the left cord, is known to have pursued his profession without any apparent damage to the voice. A single growth, especially if pedunculated, can generally be so completely removed that the restoration of voice may be confidently predicted; on the other hand, in the case of multiple and recurrent papillomata the prognosis is much less favourable. Thanks to the introduction of cocaine, operative procedures for the removal of laryngeal growths have been greatly facilitated.

Stoerk had seen individuals who had suffered from papillomata with recurrences for twenty-five years. There are now numerous instances on record in which growths, usually soft papillomata, have been expelled during a violent fit of coughing. The spontaneous disappearance of laryngeal growths has been noticed after the performance of tracheotomy. Papillomata are not infrequently present in youth, and they occasionally disappear without any operative treatment, but the rarity of this fortunate occurrence scarcely allows of its being taken into account in the prognosis.

Treatment.—Before deciding on the removal of an innocent growth in the larynx, the possibility of damaging the adjacent soft parts in attempts at removing the growth must, of course, be borne in mind. The amount of success in removal of these growths naturally depends on the practice and skill of the operator, and the operation should certainly be left in the hands of those who are in the constant habit of treating laryngeal cases. Some tumours, notably

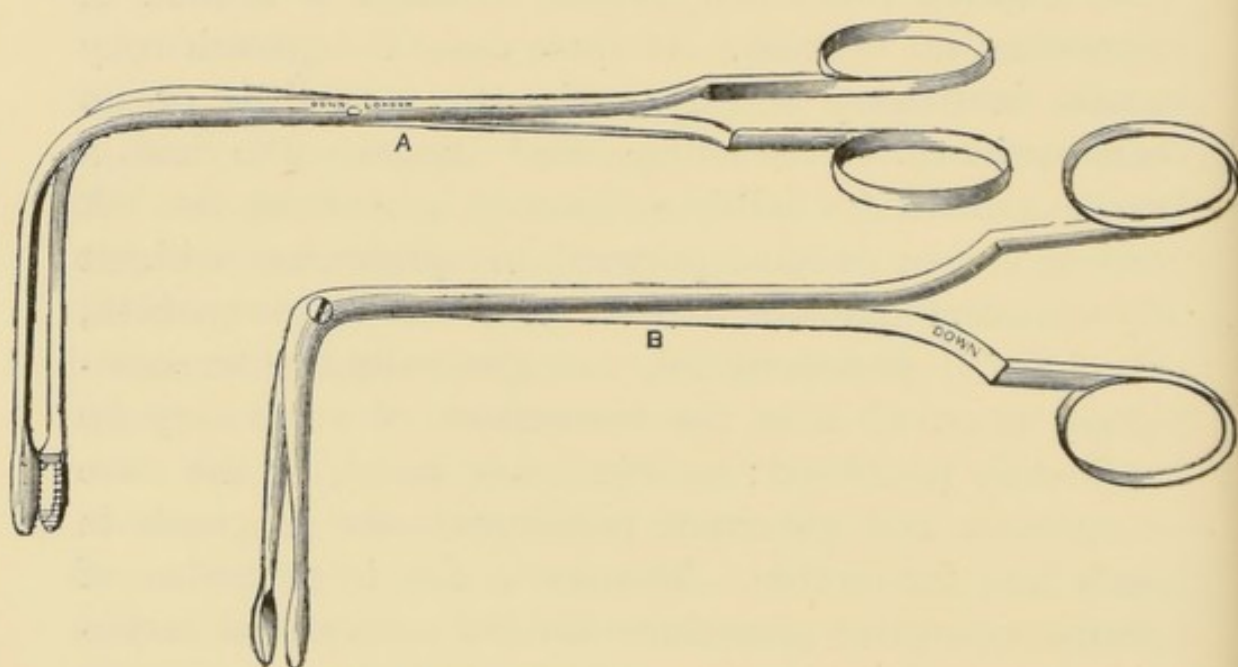


FIG. 61.—Mackenzie's Laryngeal Forceps.

fibromata, which are sessile or embedded in the vocal cord, require much greater skill in removal than pedunculated growths; again, the situation of the growth is an important factor in treatment.

It must also be remembered that some growths, and especially fibromata, as already mentioned, after a time remain stationary, and may even shrink.

Recent experience has fully confirmed the following statement enunciated at the International Medical Congress of 1881 :—“Every benign laryngeal tumour ought,

if possible, to be removed *per vias naturales*, and only if an experienced laryngologist has established the inexpediency of this method may the extra-laryngeal operation be adopted."

The two most common methods of removal are by means of the forceps and the snare. In this country, Morell Mackenzie's cutting forceps (fig. 61) have been largely employed, and if used judiciously, and in suitable cases, they answer admirably. In the case of pedunculated growths, and especially where these are attached to the free edge of the vocal cords, Grant's

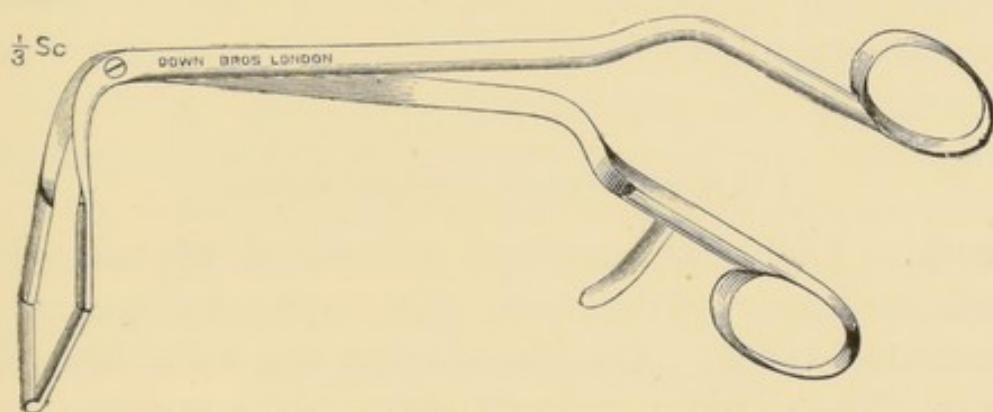


FIG. 62.—Grant's Endo-Laryngeal Safety Forceps.

endo-laryngeal safety forceps (fig. 62) are exceedingly useful.

Great care should be taken to remove all the benign neoplasm, because inefficient removal is very likely to be followed by "recurrence in the growth." Only in the case of angiomata should the galvano-cautery be used as a means of destroying a laryngeal growth.

Then there are various kinds of tube forceps, such as Mackenzie's and Schroetter's. Some operators prefer the snare (fig. 64). One objection to the use of the snare is that supposing the growth is tougher than was expected, there may be equal difficulty in disengaging the wire as in removing the growth. This difficulty

may be obviated by having the snare attached to a galvano-caustic apparatus, so that in case of need the wire may be made red hot, in order to burn through the

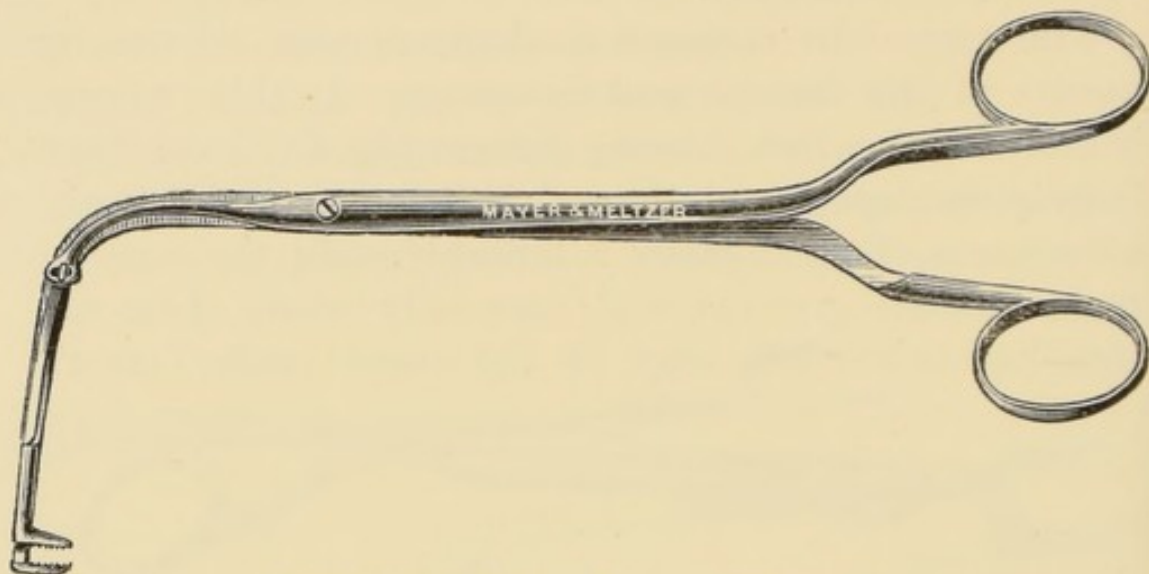


FIG. 63.—Wolfenden's Laryngeal Forceps.

growth. Lichtwitz employs a method of removing papillomatous growths from the larynx by means of fenestrated tubes. On introducing the tube into the larynx, the growths protrude through the opening, and

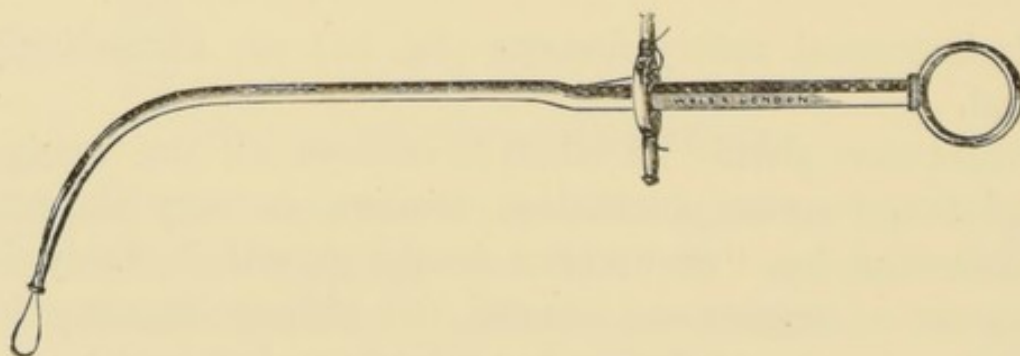


FIG. 64.—Gibbs' Laryngeal Snare.

can then be removed. In the case of large growths where attempts at intra-laryngeal removal may cause spasm and obstruction of the glottis, it may be well to ensure the safety of the patient by a preliminary laryngotomy.

The introduction of cocaine has much facilitated all intra-laryngeal operations; the application of a 20 per cent. solution to the pharynx and larynx is usually sufficient to produce marked anæsthesia of these parts.

In the case of young children with congenital tumours or other growths which do not embarrass respiration, operative procedures may be postponed until the child is old enough for operation *per vias naturales*; if, however, dyspnœa is urgent then tracheotomy should be performed and a similar postponement carried out.

In other instances by direct autoscopy it may be possible to see the laryngeal growths in children and remove them with forceps, or as has been suggested and practised by some, scraping off the soft papillomata with the nail of the index finger passed into the larynx when the latter is large enough to admit of the procedure. In such a case the child should be skilfully held by a nurse in the same position and manner as is required for intubation (*vide* page 493).

Scanes Spicer has advocated and successfully practised the removal of papillomata in children by a combination of general chloroform, and local cocaine, anæsthesia. The pharynx and larynx are freely cocainised and then perseveringly swabbed free from all mucus and saliva, when removal of the growths can be accomplished with suitable forceps, *e.g.*, Mackenzie's.

On the principle that if the larynx be given functional rest, multiple papillomata in children sometimes disappear, and bearing in mind their tendency to recur after removal, Hunter Mackenzie has suggested tracheotomy as a mode of treatment, and he cites cases in which this treatment alone has been adopted with success. As a general rule, however, tracheotomy only relieves the dyspnœa and very rarely cures the case.

Laryngo-fissure should never be adopted in these circumstances (1) because the procedure will not insure their non-recurrence and (2) it may produce permanent injury of the voice.

In the case of larger growths in which it is not possible to remove all the pedicle, the base may be rubbed with a 20 per cent. solution of lactic acid, to prevent recurrence. Rossbach has employed a 50 per cent. solution for the same purpose, but the weaker solution will usually be found sufficient.

In the treatment of enchondromata, the solvent action of chromic acid on cartilage can be advantageously utilised. Fletcher Ingals has cured a case of sub-cordal cartilaginous tumour growing from the thyroid cartilage, by twelve or thirteen applications of the acid, at intervals of three weeks to several months. Except in these cases, caustic applications to benign growths in the larynx are to be condemned; they can do no good, and may, by exciting spasm or inflammation, render tracheotomy necessary.

If the growth be non-pedunculated, it may be impossible to snare it or to remove it by the cutting forceps; in this case, the galvano-cautery may be employed, or the curette. Massei is a great advocate for the use of the latter, using Heryng's curettes (the same as employed in the treatment of laryngeal tuberculosis). He says that this method of treatment is very serviceable for growths situated in the sub-glottic region, and especially for diffuse papillomata on the free edges of the vocal cords. After the curette has been used, lactic acid can be rubbed in.

J. F. Baldwin records a remarkable case of a boy, in which a large papilloma, filling the anterior commissure, was completely cured by wearing a full-sized

intubation tube every night for a period of one month.

The fear, which has been expressed by some writers, that repeated attempts at the removal of benign new growths by the endo-laryngeal method may result in the conversion of benign into malignant growths, in consequence of the irritation to which they may have been exposed, has been shown by the large statistics collected by Semon to be utterly groundless. It must, however, be borne in mind that benign growths may undergo malignant degeneration in the larynx as in other parts of the body.

The extra-laryngeal method should only be employed in cases in which the tumour is unusually large, or seated on a broad base. It may also be impossible to remove a growth *per vias naturales* if it be infra-glottic, or if it arise from the interior of the ventricle. Some papillomata grow so rapidly that it may be necessary to remove them through an external incision.

16. MALIGNANT NEW GROWTHS OF THE LARYNX.

New formations of a malignant nature (carcinomata and sarcomata) growing from the mucous membrane of the larynx. For clinical convenience, cases of malignant disease of the larynx may be divided into two groups, viz., intrinsic and extrinsic. Intrinsic malignant diseases of the larynx includes tumours growing from the ventricular bands, the ventricles, the vocal cords, and the parts immediately below the cords. The term extrinsic is applied to growths taking their origin from the epiglottis, the ary-epiglottic folds, the

inter-arytenoid fold, the pyriform sinus, and the posterior surface of the cricoid plate.

Ætiology.—Cancerous tumours of the larynx are very rare under thirty years of age, but their rate of incidence gradually increases after that period, and reaches its maximum between the ages of fifty and seventy. As regards the sarcomata, they are much more equally distributed, nearly as many being met with under, as above fifty.

Males are much more liable than females to both cancer and sarcoma, the proportion being about four to one. Of other ætiological factors little can be stated definitely. The predominance of males would suggest over-use of voice, exposure to changes of temperature, tobacco-smoking and other irritants, as possible factors in the production of malignant disease of the throat.

Morbid Anatomy and Pathology.—Under the head of malignant disease of the larynx are included carcinomatous and sarcomatous tumours, the former occurring much more frequently than the latter.

The anatomical peculiarities of these growths in the larynx differ in no respect from similar growths elsewhere, and it need only be said that epithelioma (squamous-celled carcinoma) is by far the most common form of malignant disease affecting the larynx.

As regards the situation of the neoplasm in the larynx, it may be mentioned that only in 5 cases out of 50 was the growth infra-glottic.

The larynx is very rarely affected secondarily, and, in cases of primary disease, secondary growths in other organs are uncommon. This is probably accounted for by the fact that the lymphatics of the larynx do not form such free communications with the neighbouring vessels, as is so common in many other parts of the body.

Symptoms.—Hoarseness is one of the earliest symptoms of intrinsic cancer of the larynx, and though it generally increases with the progress of the disease, the voice is hardly ever entirely lost. Pain is occasionally an early symptom; but it may be quite absent, of so trivial a nature, or so temporary, as not to form an important feature of the disease. Extension of pain to the ear is in no way pathognomonic of cancer, as it is also present in other chronic laryngeal diseases. External pressure over the larynx, especially on the affected side, not uncommonly induces pain. Cough is not a constant symptom; there is usually, however, an increased secretion of mucus, and later on in the disease the expectoration, as well as the breath, of the patient may be offensive. Fauvel regards salivation as a constant symptom. Hæmorrhage, especially if abundant, points to malignant disease. The degree of dyspnœa will depend on the amount of obstruction to the lumen of the larynx, whereas dysphagia is affected by the situation of the growth, being present when the posterior wall is attacked, or the epiglottis is implicated. Cachexia, such as is met with in malignant diseases of other organs, is not an early or marked feature of the intrinsic laryngeal affection; it rapidly supervenes when the disease spreads to the neighbouring mucous surfaces or perforates the laryngeal cartilages.

Objectively, though there is nothing absolutely distinctive in the appearance of laryngeal cancer, still the experienced laryngologist will generally be able to form a correct opinion from the laryngoscopic examination. According to Semon early malignant disease of the vocal cords may show itself as (1) a single unilateral congestion; (2) a diffuse infiltrating growth with red, uneven surface; (3) a white or reddish-grey, broad

based, rarely pedunculated, semi-circular or oblong wart, generally single and bearing a resemblance to papilloma or fibroma; (4) an uneven fringe-like outgrowth from the cord. On the ventricular bands or ary-epiglottic folds and other parts of the larynx, it may appear as a definite tumour, or as a deep greyish-pink infiltration with a coarsely mammillated or uneven surface.

The same observer has rightly emphasized the importance of impaired mobility of the affected cord, as a diagnostic sign of cancer.

The rapidity of growth of malignant tumours of the larynx varies very much, for a while they may appear to grow very slowly, or on the other hand their extension may be rapid and obvious, and ulceration is not long delayed. As a general rule the tendency of these growths is to spread posteriorly, and to grow *into* rather than *out of* the tissues upon which they are situated.

Malignant growths most frequently spring from the ventricular bands, and the posterior part of the larynx is attacked by preference. Tumours growing from the vocal processes, and the inner surface of the arytenoid cartilages, may be mistaken for pachydermia, and *vice versa*.

In the later stages of the disease, the soft parts of the larynx may become infiltrated, and finally perichondritis may result, and the malignant growth may even eat its way through the skin, and appear externally. Enlargement of lymphatic glands is very rare with intrinsic, but common with extrinsic, cancer of the larynx. Glandular enlargement may exist, but may not be detected during life. Further clinical experience has confirmed Butlin's contention that it is quite exceptional for the glands to become affected in cases of

sarcoma of the larynx. Enlarged lymphatic glands may press on the recurrent laryngeal nerve, causing partial or complete loss of movement in the vocal cord, and thereby give rise to hoarseness.

Diagnosis.—When a middle-aged individual complains of hoarseness, or marked alteration in the voice of more than a few weeks' duration, the larynx should at once be examined by some one skilled in the use of the laryngoscope. If such an examination reveals a localised growth or thickening on one vocal cord, possibly slightly congested or of a different colour from the surrounding parts, the cord itself being less mobile than its fellow, the possibility of early malignant disease should be given the fullest consideration. The older the patient the greater is the probability of this being the case. Such a growth situated at the posterior part of the larynx in an adult favours the above suspicion. Microscopic examination of portions of the growth, removed for the purpose, or expelled by cough, is only of decisive value when such fragments are found to be malignant; a merely negative result is of little or no significance. It is not desirable to remove portions of the growth for this purpose, unless the patient has previously consented to a radical operation, in the event of the microscopic examination proving malignancy, inasmuch as partial removal tends to stimulate the growth of the remainder.

For the diagnosis of malignant disease of the larynx from syphilitic and tuberculous affections of this organ, see pp. 463 and 477.

Among the difficult cases for diagnosis are those which at first present the symptoms of perichondritis and its consequences. In the absence of evidences of syphilis or tuberculosis, and bearing in mind the great

rarity of primary laryngeal perichondritis, the mere existence of perichondritic inflammation should suggest the suspicion of malignant disease. In very exceptional cases, the discharge of an abscess into the larynx may be the first indication of malignant disease.

Clinically it is almost impossible to distinguish between a sarcoma and a carcinoma. The outline of the sarcomata is usually more smooth and regular than that of the carcinomata, they are softer in consistence, and, as already mentioned, the lymphatic glands are only exceptionally affected. Nevertheless, in most cases a microscopic examination of portions of the growth removed for the purpose, is usually necessary to clinch the diagnosis.

The great, nay insuperable, difficulties which sometimes attend the diagnosis of malignant disease of the larynx, are well illustrated by a case of Beschorner's. When the patient, a lady of seventy, first came under observation, a diagnosis of papilloma was made and verified by microscopic examination of portions of the growth; the following year, the rapid growth and extension of the neoplasm, and a microscopic examination, led to the diagnosis of carcinoma. Tracheotomy was performed, and the patient remained free from further laryngeal troubles, eventually dying from cardiac failure, some six years after she first came under observation. At the post-mortem, the growth was found to be papillomatous and not cancerous. As already stated, the posterior parts of the larynx form the favourite site of malignant growths, while benign growths generally arise in the middle or anterior parts. An exception to the latter rule occurs in the case of pachydermia, which when extensive may simulate malignant disease. In such cases, however, the

disease is often bilateral and the vocal cords quite mobile, and where the cords come into fair apposition the voice may be little affected.

Where there is any doubt as to the nature of the intra-laryngeal growth it is always well to give large and increasing doses of iodide of potassium, bearing in mind of course, that some cases even of malignant disease improve temporarily under the influence of the drug.

Prognosis.—Intrinsic carcinoma of the larynx is not so quickly fatal as the extrinsic form; still, death may occur within the year, but, on the other hand, it does not usually occur under eighteen months, and it may even be delayed three, four, or more years. The fatal termination is generally brought about by cachexia, especially if the tendency to death by asphyxia has been averted by tracheotomy. In the absence of of this operation, death may be due to suffocation, which may come on quite suddenly. Lung affections and pyæmia sometimes bring about a fatal termination. Death due directly to loss of blood is rare; in a case seen by one of us (F. de H. H.) the patient was much weakened by large and repeated losses of blood, and his end was apparently greatly accelerated by the hæmorrhage. Sarcoma follows much the same course as carcinoma, and is only a little less rapidly fatal. With regard to cases surgically treated, statistics and experience go to show that the prognosis is good if the growth is intrinsic, of limited extent and occurs in patients of suitable age and good general health. On the other hand the prognosis is unfavourable in extrinsic or extensive intrinsic malignant disease, when situated on the posterior part of the cricoid cartilage, in very old patients, or where the general health and vitality is

lowered, and in cases where the neighbouring lymphatic glands are enlarged.

Treatment.—When once the diagnosis of malignant disease has been satisfactorily established, it is not advisable, under ordinary circumstances, to attempt to remove the growth *per vias naturales*. It is almost impossible to do so efficiently, and even when the growth appears to be small and localised, we know from experience that it is more extensive and deeply infiltrating than the laryngoscope would lead us to believe. Furthermore, in view of the excellent results now to be obtained by thyrotomy, and the few risks incurred by the operation where proper precautions are taken, it is doubtful whether we are justified in advising patients to submit to the uncertain and unsurgical procedures involved in intra-laryngeal treatment. The diagnosis having been made, the growth being suitable for removal, and the patient being in good general health and of a proper age, it is the duty of the surgeon to urge him to at once submit to a radical operation which has an excellent prospect of curing him, and obviating what must otherwise prove a speedily fatal disease.

With regard to the radical methods of treatment, three kinds of procedure are open to the surgeon:—(1) Thyrotomy, with removal of the diseased parts; (2) Partial excision of the larynx; and (3) Complete excision of the larynx.

These operations offer the best prospect of success, if restricted to cases of intrinsic malignant disease of the larynx. The earlier in the course of the disease that the operation is carried out, the better is the patient's chance. Cancers which have invaded the soft parts, or in which the glands are enlarged, are no longer amenable to any but palliative treatment. A

radical operation is not to be recommended for patients over seventy, for those who are feeble, or who are suffering from any serious organic disease.

The careful study of the writings and statistics of Semon and Butlin (to whom we are indebted for the great advances made during recent years in the treatment of malignant disease of the larynx) go to show that the most successful results, in many cases amounting to actual cure, are those in which the radical operation has been performed in an early stage of the disease, when the interference can be limited to the performance of thyrotomy, with removal of the soft tissues only. In such cases as these, patients have rapidly recovered from the operation and remained free from recurrence $7\frac{1}{2}$, 6, and 4 years after the operation. It is no less surprising what an excellent voice is retained by many of these patients even when a vocal cord and ventricular band have been entirely removed, the place of the latter structure being taken by a cicatricial band of fibrous tissue or pseudo-cord, which in conjunction with the healthy vocal cord forms a fairly efficient glottis.

Even when partial excision of the larynx has been found necessary, the results have been surprisingly good, but as such operations are only needed where the disease is more extensive, we can scarcely expect quite such good results as in thyrotomy, and still less must this be the case in complete excision of the larynx, which, under any circumstances, is a very serious operation.

The details of the latter operation will be found in textbooks of general surgery, we have here only space to describe the operation of thyrotomy or thyrochondrotomy, for the details and technique in connexion with

which, we are largely indebted to Hahn, Butlin, and Semon.

Operation.—Under chloroform an incision is made in the median line from a finger's breadth above the thyroid notch to the sternum. The soft parts are separated over the trachea, if necessary the thyroid isthmus is divided, and the trachea is opened. A Hahn's aseptic sponge cannula is inserted. The latter takes about ten minutes to swell and occlude the trachea, and in the meantime the thyroid cartilage is divided in the middle line; for this purpose a nasal saw is useful as the calcified cartilages may render a knife or even strong scissors useless. The halves of the thyroid cartilage are now held apart with blunt hooks, the extent of the growth inspected, and to it is applied a dossil of wool soaked in cocaine solution, 10 to 15 per cent. The object of this is to induce an artificial ischæmia of the parts. Ten minutes having elapsed since the insertion of the cannula, a sponge is passed upward from the larynx into the pharynx to prevent mucus and saliva flowing downwards during removal of the growth. The latter is now seized in small vulsellum forceps, a free incision made round it into the healthy parts, extending in depth to the cartilage of the thyroid. By means of knife or curved scissors the included growth and tissues are cut freely away, and their base of origin scraped with a sharp spoon, leaving the cartilage bare. As a rule the bleeding is slight, and when this has ceased the parts are thoroughly dried and insufflated with iodoform. The sponge in the pharynx is removed through the mouth and the tube from the trachea. It is well to draw together the sides of the thyroid cartilage by a silk stitch passing through the external soft tissues and not actually penetrating

the cartilages so as to appear in the lumen of the larynx.

The soft parts including the skin wound may then be drawn together by a few superficial stitches and an external dressing applied.

Some do not advise closing the external wound immediately after the operation, but in three cases in which I (H. T.) have adopted this measure (one patient being still alive and free from recurrence, four years after the operation) it has given excellent results, the patient having been able to go out nine days after the operation.

The patient should lie in bed upon that side which has been operated on, and the head should be kept low. For the first twenty-four hours nutrient enemata and suppositories may be given, and then small quantities of iced milk or nutrient jellies by the mouth, and some semi-solid food on the third or fourth day, if all goes well.

By skilful nursing, careful attention to asepsis, and details of technique, the dangers of septic pneumonia, which formerly made the operation so fatal, can now be almost entirely averted.

The immediate risk to life after the operation for complete extirpation of the larynx, and the condition in which the patient is left, even if the operation be successful, will probably prevent it ever being regarded as one of the triumphs of surgery.

Should it be deemed inadvisable to submit the patient to any radical treatment, attempts may be made to relieve the pain and dysphagia by insufflations of orthoform, or the application of a 10 or 20 per cent. solution of cocaine by means of the spray or brush. If the growth be ulcerating, and the secretion foetid, in-

sufflation of formula No. 47, or antiseptic inhalations, such as formulæ Nos. 69, 70, 71, will be found useful. In some cases it may be necessary to feed the patient per rectum. In the event of death threatening from stenosis of the larynx, tracheotomy should be performed, and it will, in a large number of instances, lengthen considerably the duration of life. As the malignant disease may extend downwards, it is advisable to perform a low tracheotomy.

17. TUBERCULOSIS OF THE LARYNX.

Tuberculous Laryngitis ; Laryngeal Phthisis.

A chronic disease of the larynx, depending on the presence of tubercle, and almost invariably associated with pulmonary tuberculosis.

Ætiology.—Laryngeal tuberculosis is met with in about thirty per cent. of the cases of pulmonary tuberculosis. The question of a primary laryngeal tuberculosis has received much attention. Undoubtedly primary laryngeal tuberculosis is very rare, but its possibility has been rendered certain by the fact, that a few cases have been recorded, in which, at the necropsy, tuberculous disease of the larynx has been found without any deposit in the lungs. In the great majority of cases, however, laryngeal tuberculosis is secondary to the pulmonary affection. Any of the conditions, which were mentioned as giving rise to laryngitis, are also operative in favouring the onset of laryngeal tuberculosis in persons of the tuberculous diathesis. In patients suffering from pulmonary tuberculosis, who at the same time have an abrasion of the

laryngeal mucous membrane, the larynx, in all probability, becomes infected by the bacillus-laden sputa. The recent researches of Horne in connection with the pathogenesis of tuberculous laryngitis are of great interest. He examined a large number of larynges, which post-mortem presented to the naked eye none of the usual signs of this disease, but which had been removed from bodies of persons who had died undoubtedly from pulmonary tuberculosis. The result of his investigations go to show that (1) the laryngeal ventricles are important harbours for tubercle bacilli, (2) the earliest signs of the tuberculous processes are to be found in those parts which are rich in lymphatics, and this is most marked in the ventricles, inter-arytenoid region, posterior third of the cords, and the petiolus of the epiglottis. It seems probable that syphilitic ulceration of the larynx may predispose to laryngeal tuberculosis, by affording a suitable nidus for the development of the tubercle bacillus.

Morbid Anatomy and Pathology. — Primary tuberculosis of the larynx is characterised by the occurrence on the mucous membrane, singly or in groups, of small roundish nodules, sometimes attaining the size of a pin's head.

In secondary tuberculosis of the larynx three stages may be recognised:—(1) A catarrhal condition associated with temporary or more persistent hyperæmia, and corresponding probably to the deposit of tubercle in the laryngeal tissue, producing changes not yet visible to the naked eye. In other cases patchy or more widespread anæmia of the laryngeal mucosa may be noted, and this is often associated with anæmia of the soft palate and epiglottis.

(2) The stage of infiltration. In this stage the mucous

membrane will be found swollen from cellular infiltration of the mucosa and sub-mucosa. The epiglottis is enlarged, pale, and turban-shaped, while the puffy, pear-shaped, œdematous appearance of the arytenoids is very characteristic.

(3) Stage of ulceration. Here the tubercles (which have first produced the œdematous appearances) break down and small superficial ulcers appear, which rapidly run together and extend both superficially and in their depth, so that eventually they may lead to perichondritis, with necrosis and exfoliation of the cartilages. Tubercle bacilli are found in the secretion bathing the surface of the ulcers, and in the giant-cell systems.

Other morbid appearances characteristic of early and advanced laryngeal tuberculosis will be found under the heading of laryngoscopical appearances (p. 459).

Symptoms.—The symptoms of tuberculosis of the larynx are so intimately blended with those of the pulmonary affection, that it is difficult at times to assign the due share to each organ. Horne's researches point to the probability of a pre-catarrhal stage of tuberculous laryngitis, corresponding with the early deposit of tubercle in the larynx, but without any naked eye manifestations of the same. Hoarseness is an early symptom of the disease, and frequently passes into complete loss of voice; it may be owing to an implication of one of the recurrent laryngeal nerves (more commonly the right), in a lesion of the lung or of the bronchial glands. Cough and expectoration are almost invariably present, as the result of the combined laryngeal and pulmonary affection. One of the most painful and characteristic of the symptoms of laryngeal phthisis is dysphagia, due to the swollen and ulcerated condition of the larynx, and especially of the arytenoids. If the

epiglottis be ulcerated, there is acute pain on swallowing. In some cases, distressing attacks of coughing and suffocation ensue upon the patient attempting to take food, so that he suffers greatly from malnutrition. The shortness of breath usually observed in laryngeal phthisis is, in many cases, due to the pulmonary mischief. Dyspnœa of sufficient moment to necessitate tracheotomy is rare, but it may come on at any time from œdema of the larynx, or more gradually from fixation of the vocal cords in the median position.

Laryngoscopically, one of the earlier signs to suggest the onset of tuberculous disease is pallor of the laryngeal mucous membrane. A partial anæmia, *i.e.*, pallor limited to the epiglottis, ventricular bands, and the mucous membrane covering the arytenoids, is more suggestive than a general anæmia. In some cases, the blood-vessels coursing over the surface make the anæmia more apparent. In any case, partial or even general anæmia of the larynx should suggest a careful examination of the lungs in order to detect any incipient phthisis, and the patient should be kept under observation. Contrasting with this anæmic condition of the rest of the larynx, one vocal cord may sometimes be noticed to be congested, a condition which is always very suspicious of tuberculous mischief, although syphilis and early malignant disease may sometimes produce a somewhat similar condition. Pallor is distinctive of the chronic and more frequent form of laryngeal tuberculosis, but, as Cohen has pointed out, there is an acute form in which congestion of the mucous membrane is a marked feature. This condition, which resembles an acute catarrhal laryngitis, passes, in the course of two or three weeks, into a chronic laryngeal catarrh, and it is only later on that the manifestations of the tuber-

culous nature of the affection become indubitable. Very frequently, the acute stage described above is altogether absent, and the disease begins with the signs of a chronic laryngitis, and it is only the presence of lung mischief and the further development of the case which enable the diagnosis to be made. A suspicious condition is a serrated appearance of the inter-arytenoid fold of mucous membrane; later on this may be the seat of ulceration. It must be borne in mind, however, that a tumefaction in this position is often present in some forms of chronic laryngitis, and forms one of the well known varieties of pachydermia. In the tuberculous manifestation the swelling consists, as a rule, of soft granulation tissue in connexion with a tuberculous ulcer; in pachydermia it is tough, and consists of a thickening of the epithelial and sub-epithelial tissues. In very rare cases, tubercle is deposited in the form of miliary nodules of a yellow colour on the laryngeal mucous membrane, and these nodules may break down and form shallow, lenticular ulcers.

The later stages of laryngeal tuberculosis are very characteristic. The most frequent manifestation is a pyriform swelling of the arytenoids, which prevents the approximation of the vocal cords. The epiglottis may take on a similar condition, presenting a turban-like appearance. The infiltration may extend into the ary-epiglottic folds, so that the glottis may be almost occluded by a pale, puffy swelling extending all round it. The swollen mucous membrane is prone to ulcerate. The ulceration generally commences superficially, but extends in length and depth. In some cases only the stump of the epiglottis may be left. The ulcerated surface is usually bathed in a milky-white secretion, which is very characteristic of tuberculous ulceration.

In the varieties of laryngeal tuberculosis just described, the vocal cords may be but little affected, though they usually lose their polish and become dull. There are, however, cases in which the brunt of the disease falls on one or both cords, which become injected and thickened, and after a time ulceration occurs. Quite irrespective of any gross alteration in the cords themselves, loss of mobility in one or both cords is frequently observed. This may be due to functional causes, as is the case in hysteria, or degenerative changes may have taken place in the laryngeal muscles. There may also be paralysis from pressure upon the laryngeal motor nerves, on the right side, due to the recurrent being implicated in a pleural thickening at the apex of the right lung, and on the left side from enlarged glands. Lastly, there may be some mechanical condition preventing the approximation of the cords, such as swelling of the soft parts, or ankylosis or other disease of the crico-arytenoid joint.

In some cases, the vocal cords become fixed almost in the phonatory position, giving rise to the symptoms of laryngeal stenosis, and simulating a bilateral abductor paralysis. Sluggish action, or, as it has been termed, *lameness* of one cord, has been thought to point to tuberculous disease in the corresponding lung; but this is very problematical.

Of late years, attention has been directed to the occurrence in the larynx of tumours of a tuberculous nature. They are not necessarily accompanied by any other obvious lesion of the larynx, and they may therefore be regarded as the first local manifestation of the tuberculous process. Such mammillated, polypoid, stalactitic, or villous growths are found issuing from the ventricles, the posterior part of the cords, and from the inter-arytenoid space.

Diagnosis.—In the early stages, when there is merely pallor of the mucous membrane, or congestion of the cords, the diagnosis must, to a large extent, depend upon the result of an examination of the lungs, and of the sputum for the specific bacillus, as there is at this time nothing characteristic in the appearance of the larynx, and it may merely represent a pretuberculous catarrhal laryngitis. If the congestion be limited to one cord some grave disease should be suspected. The pale, puffy swelling of the epiglottis, arytenoids, and ary-epiglottic folds is pathognomonic. Where ulceration is the chief feature, syphilis and cancer have to be excluded. The withdrawal of some of the secretion from the larynx by means of a brush, under guidance of the laryngeal mirror, and the discovery of tubercle bacilli, will settle the point in favour of tuberculosis. As a rule, the ulcerative process is slower in tuberculosis than in syphilis, the ulcers are smaller, more superficial, more numerous, are seated on a paler base, and have a worm-eaten appearance; rapid and advancing destruction of the epiglottis and the presence of cicatrices are in favour of syphilis. In making a diagnosis, however, it must be borne in mind that syphilis and phthisis may co-exist, and that a case originally syphilitic may take on a tuberculous transformation. Even at the necropsy it may be extremely difficult to say whether syphilis, or tuberculosis, or a combination of both, are present. Ulceration attacking one cord alone is in favour of syphilis, although, as already pointed out, a similar condition may mark the early tuberculous invasion. Tuberculosis of the larynx may usually be differentiated from malignant disease by the presence of pulmonary phthisis, the pallor of the pharynx and larynx, the pale, puffy swelling of the

arytenoids, and by the fact that, as a rule, both sides of the larynx are implicated. In malignant disease, on the other hand, usually only one side of the larynx is at first attacked, and there is congestion and impaired movement of the affected cord. The ulcers of laryngeal phthisis are usually small and multiple, a single large ulcer being more characteristic of malignant disease. The age of the patient will often aid in the diagnosis, as malignant disease is rare under thirty-five, whereas laryngeal phthisis is most common between the ages of twenty and thirty; and three-quarters of the cases, according to Morell Mackenzie, occur under the age of forty. The differential diagnosis between tuberculosis and lupus of the larynx is discussed on p. 256.

Prognosis.—Though cases of arrest and even cure of tuberculous ulceration of the larynx have, from time to time, been recorded, and especially within the last few years, as the outcome of the recent advances in the local treatment of the disease, nevertheless it must be confessed that the outlook of a patient with laryngeal tuberculosis is a gloomy one. This is due largely to the fact, that while it may be possible to attack the laryngeal disease, the pulmonary lesions are too often irresistably progressive, and infectious material (sputum) is constantly being brought into contact with the higher lesions. In very early cases of lung mischief with laryngeal manifestations, it is possible, however, under suitable circumstances to cure the laryngeal as well as the pulmonary disease, but when both exist in an advanced degree it is highly questionable whether we are justified in doing any more than alleviating symptoms as they arise. Cases of the spontaneous cicatrization of tuberculous ulcers of the larynx are occasion-

ally seen, but such an happy termination is unfortunately rare.

Treatment.—The constitutional treatment of laryngeal tuberculosis differs, in no respect, from that which has been found useful in pulmonary tuberculosis. The internal administration of creasote is especially deserving of mention. The drug may be administered in the form of capsules, each containing 2 minims. One of these may be taken three times a day, and as the patient becomes tolerant of the drug, the number is gradually increased until six, eight, or even ten of the capsules are taken in the twenty-four hours. The capsules should always be taken immediately after food.

Sommerbrodt, from an experience of over 5000 cases, maintains that creasote is not merely a useful drug for the symptomatic treatment of tuberculosis, but that it exerts a specific influence on the disease by the resistance it offers to the cultivation of tubercle bacilli. He says that the more creasote a patient can bear in the day, the greater is the success attained.

Beech creasote, which is the best form for administration, contains from sixty to ninety per cent. of guaiacol, and of late this remedy has been substituted for creasote in the treatment of tuberculosis. The smell and taste of guaiacol are pleasanter than those of creasote, but like the latter drug, guaiacol sometimes disagrees with the patient causing vomiting and diarrhoea. It is most conveniently administered in the form of capsules, each containing two minims. Of these the patient should take at first three a day, and the dose should be gradually increased until 12 or more capsules are taken daily. The treatment requires to be persevered in for months. Where creasote or guaiacol

are not tolerated by the patient, the carbonate of guaiacol may often be successfully administered in the compressed form. Both creasote and guaiacol can be given in cod liver oil. If the creasote or guaiacol cause loss of appetite, it should be omitted for a few days, and arsenic in combination with the hypophosphites (formula No. 23) substituted.

As regards the climatic treatment of laryngeal tuberculosis, the cold, dry, rarefied air of high altitudes has been found to act unfavourably; hence, cases of this disease should not be sent to Davos Platz and similar places, but to Meran, San Remo, Pau, Madeira, Northern Africa, &c., or to one of the southern health resorts of our own country. Charazac of Toulouse has come to the conclusion that sulphur mineral waters should be avoided in the treatment of laryngeal phthisis, and in this he is supported by Heryng, Baginski, Baratoux, and others. Guinier, on the other hand, claims for the sulphurous waters of Cauterets that they exercise a very remarkable influence upon the general innervation and nutrition, and that, in addition, they have a favourable local action on the mucous membrane in cases of laryngeal phthisis.

Patients suffering from laryngeal tuberculosis should be directed to use the voice as little as possible, and loud speaking should especially be avoided.

In the early stages of laryngeal phthisis, astringents such as formulæ Nos. 38 and 41 can be employed with advantage, the iron pigment being especially useful. The application should be made with the laryngeal brush twice a week, or on alternate days, according to circumstances. In some cases, especially in the more acute ones, sedative and antiseptic inhalations (formulæ No. 68 and 71) will be found to answer better than the

astrigent applications. Schmidt highly recommends the inhalation of balsam of Peru (formula No. 72).

In those cases of laryngeal catarrh occurring in

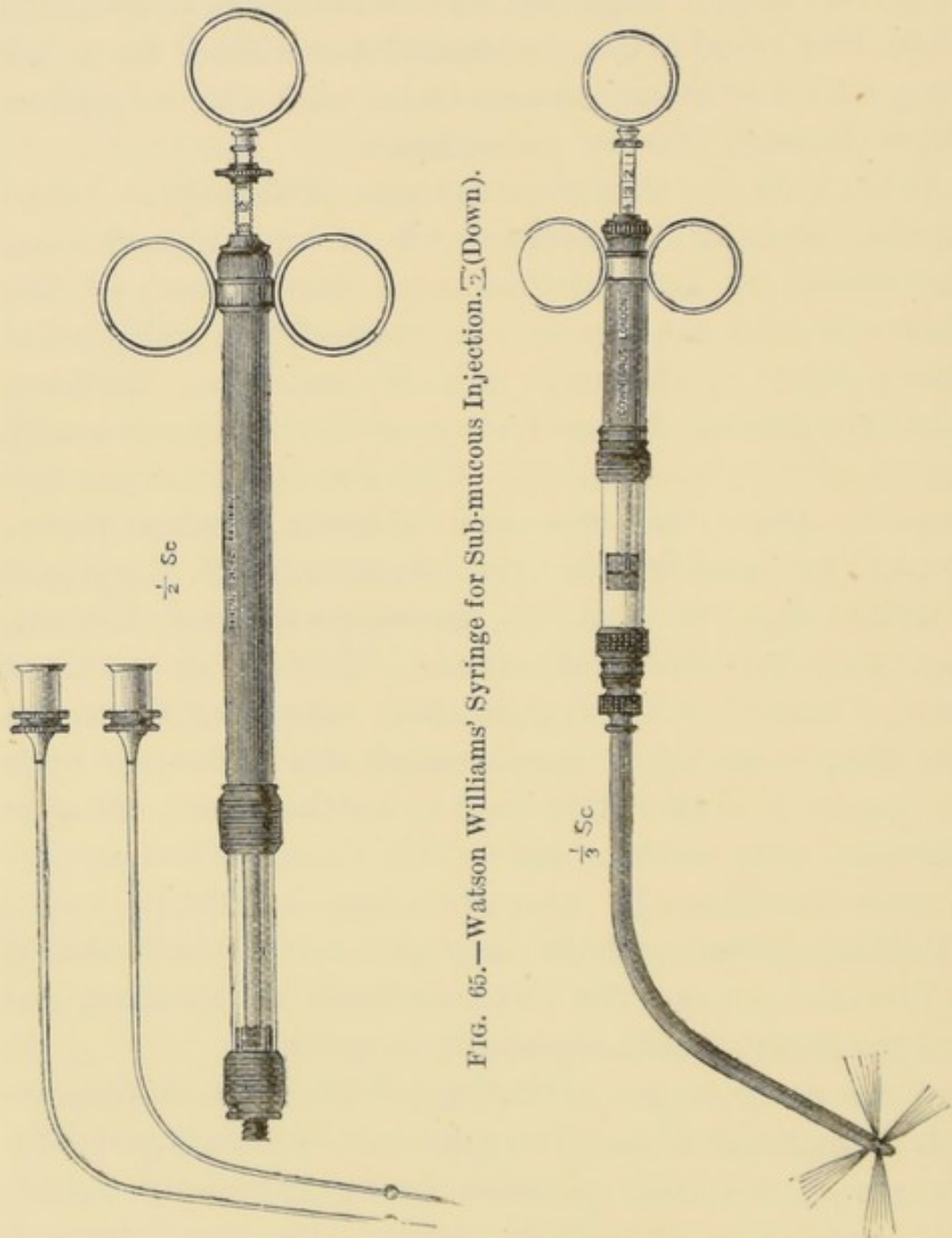


FIG. 65.—Watson Williams' Syringe for Sub-mucous Injection. $\frac{1}{2}$ (Down).

FIG. 66.—Fraenkel's Syringe for Intra-tracheal Injections.

patients with tuberculous mischief in the lungs, it would seem, in the light of recent researches, that our treatment should aim at (1) reducing the laryngeal catarrh in order to render the parts less suitable for the

growth of the tubercle bacillus, and (2) at checking the development of the latter before they arrive at this position. For these purposes astringents of iron (formula 38) or nitrate of silver (gr. xv.-xxx. ad \mathfrak{z} j.) are useful. The second indication is fulfilled by intra-tracheal injections of naphthalene and oil of cinnamon in liquid paraffin (formula 67), or 2 to 4 per cent. guaiacol dissolved in olive oil, or iodoform alone or combined with boracic acid as a laryngeal insufflation. Such treatment should be carried out at least three times a week. During the intervals the patient should inhale a nebulised solu-

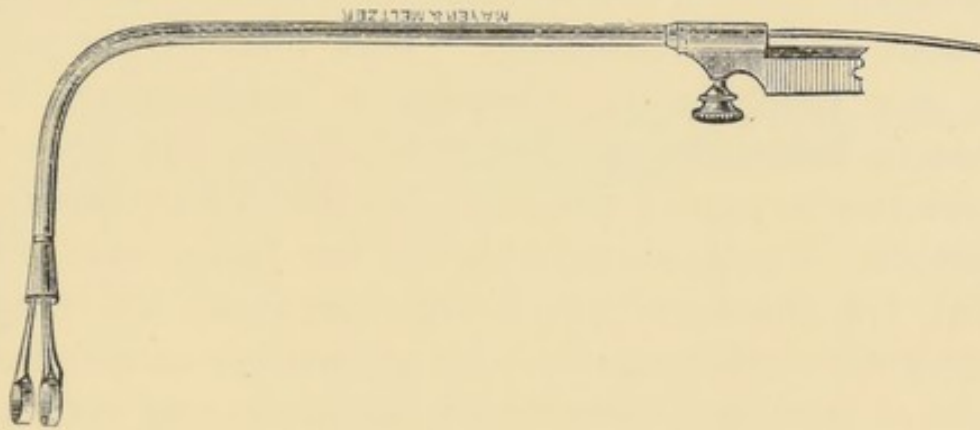


FIG. 67.—Krause's Laryngeal Curette.

tion of menthol in liquid paraffin, gr. x. ad \mathfrak{z} j., to which 16 grains of cocaine may be added if pain be a prominent symptom.

Where a local tumefaction exists without ulceration Watson Williams has obtained good results from the sub-mucous injection of a solution of perchloride of mercury in water and glycerine (1 in 1000). He says that in many cases pain is rapidly diminished and the mischief arrested after repeated injections.

In similar cases where pain is a prominent symptom Krause and Lake recommend removal of the œdematous masses with suitable forceps or double curettes,

(fig. 67) followed by the application of lactic acid to the raw surface. The relief of pain is often so great that patients, who have hitherto been almost starving, can eat their food with comparative comfort and consequently the general condition improves.

Cocaine in solution from 10 to 15 per cent. is of course applied to the larynx before these or any of the following manipulations are carried out.

When ulceration has occurred, the local treatment, which at the present time is adopted by the greatest number of laryngologists, and which appears to yield the best results, is the application of lactic acid with or without previous curetting. This method, for which we are indebted to Heryng, in combination with creasote internally as described above, has gone far to remove laryngeal phthisis from the list of incurable diseases. The cases suitable for the lactic acid treatment are those in which the laryngeal affection is apparently unaccompanied by pulmonary tuberculosis; cases of laryngeal tuberculosis accompanying early pulmonary phthisis, or phthisis running a chronic course; and lastly, cases in which the laryngeal affection gives rise to great pain on swallowing and coughing. In the last class of cases the treatment is to be considered rather as a palliative than a curative measure. He considers unsuitable cases for the treatment:—

- (a). Advanced phthisis with hectic and wasting.
- (b). Diffuse miliary tuberculous laryngitis and pharyngitis.
- (c). Cachectic conditions.
- (d). Severe stenosis of the larynx caused by inflammatory swelling of the affected parts.
- (e). Mistrusting, fearful, and nervous patients.

If ulceration has occurred in the laryngeal mucous

membrane, it is well to gently curette and freshen the surface of the ulcer and then to rub in the lactic acid by means of cotton-wool firmly wrapped round rectangular laryngeal forceps; or, better still, the forceps introduced for the purpose by Krause (fig. 68). Where there is simply an infiltration, or tuberculous outgrowths, still more energetic treatment is necessary to bring the lactic acid into contact with the sub-mucosa. For the former, Heryng advises that the acid should be injected beneath the mucous membrane by means of the sharp-pointed syringe he has devised for this purpose; or the surface may be thoroughly scraped with the

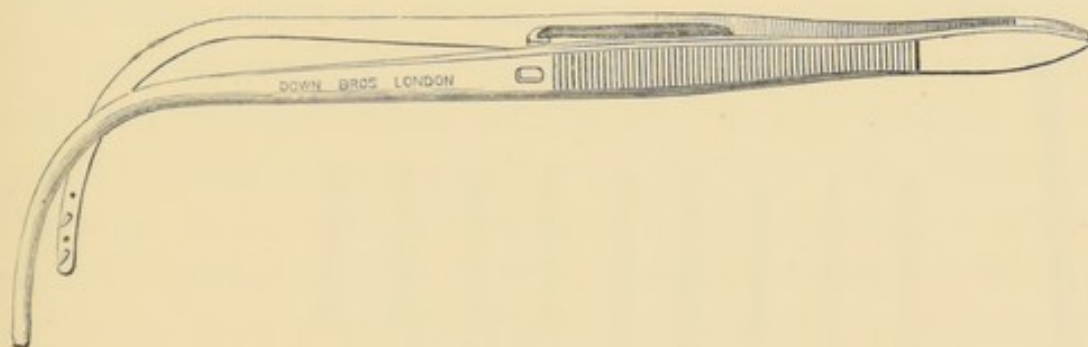


FIG. 68.—Krause's Cotton-wool Forceps.

curette, and the acid can then be rubbed in. The tuberculous outgrowths can be removed by the curette (fig. 69), forceps, or galvano-caustic loop, according to their size and shape; the lactic acid can then be rubbed into the raw surface. Before applying the lactic acid, or curetting, the affected surface of the larynx should be freely swabbed with a 20 per cent. solution of cocaine. It is advisable to begin with a weak solution of lactic acid—say 20 per cent. If but little local irritation be caused, the strength of the solution may be increased at the next sitting, otherwise it is advisable to continue the original solution for three or four sittings before

increasing the strength. A 50 per cent. solution will usually suffice to effect cicatrisation, but 60 and 80 per cent. solutions, and even the pure acid, have been employed. The applications should be made three times a week at the commencement, and then, as healing takes place, at greater intervals; from twelve to twenty, or even more applications, may be necessary to obtain cicatrisation, and the acid should be well rubbed in, some force being employed in doing so. The amount of pain experienced varies very much according

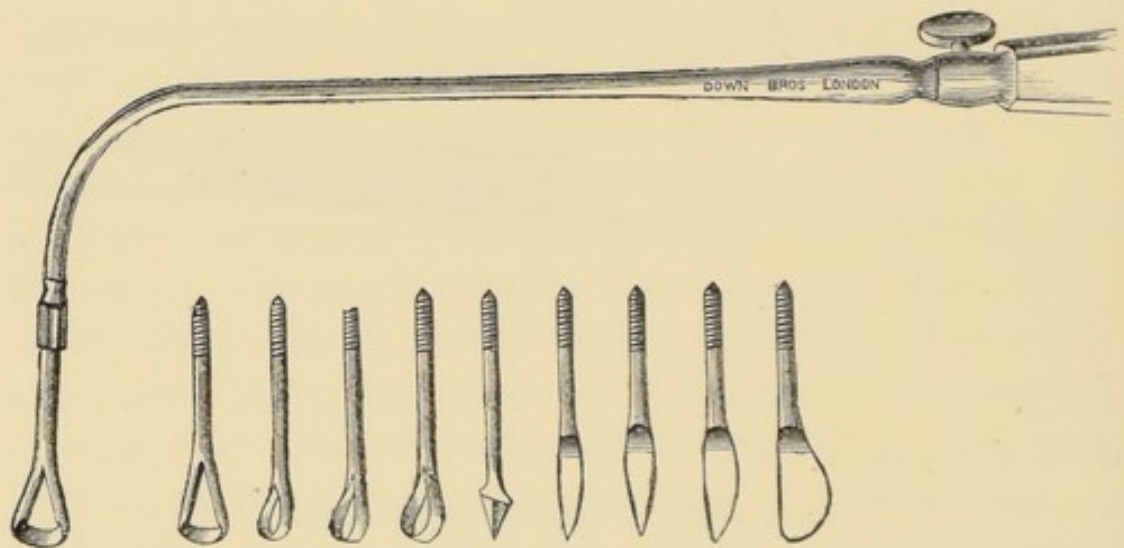


FIG. 69.—Heryng's Curette.

to the idiosyncrasy of the individual. It usually passes off in about an hour, but in some very sensitive patients it may last even twenty-four hours. Should much pain result from this method of treatment, the patient should have ice to suck, and cold compresses should be applied to the neck. The results obtained by Heryng and Krause, who introduced this method of treatment, have been confirmed by the great majority of surgeons who have given it a fair trial, both in this country and abroad, and the authors have seen most excellent results from it. In his large experience of this method of

treatment Heryng had only seen two cases of hæmorrhage in 270 cases, and advises that large infiltrations should be destroyed by means of the galvano-cautery or electrolysis. Finally in those cases where advanced tuberculous lung disease is associated with extensive laryngeal lesions, which induce great pain on swallowing, immense relief can be obtained by daily insufflations of orthoform—less relief by cocaine pastilles or a spray of the same solution.

Tracheotomy is only to be advised in cases where life is threatened by laryngeal stenosis; one great drawback to it is the fact that, after tracheotomy, there is sometimes a rapid increase in the pulmonary symptoms, and increasing difficulty in coughing. In some cases the difficulty in swallowing liquids which attends loss of the epiglottis by ulceration may be obviated by placing the patient prone across a bed, with the head hanging over the side, and allowing him to suck milk through a piece of india-rubber tubing, from a mug placed on the floor.

There seems to be some risk in the removal of primary tuberculous tumours of the larynx, because the bacilli, hitherto shut up in the tumour, can then enter the organism through the wound and set up pulmonary tuberculosis. Hence it is advised that they should be removed by the galvano-caustic loop or cautery.

For lupus of the larynx, see Lupus of Pharynx and Larynx, page 251.

18. SYPHILIS OF THE LARYNX.

Syphilitic disease of the larynx may accompany the secondary or tertiary manifestations of the disease, or it may be the result of inherited syphilis.

Ætiology.—Affections of the larynx are of very frequent occurrence in syphilis. Inasmuch as they usually start from a laryngeal catarrh, the predominance of males attacked is to be explained by their greater exposure to the effects of changes of temperature, irritating dust, alcohol, tobacco, and other causes of laryngeal catarrh.

Secondary syphilitic affections of the larynx usually occur in young adults, but there is, of course, no limit as regards age. They make their appearance most frequently from about a few weeks to a few months after infection, or their advent may be delayed for a year, or even eighteen months. Tertiary lesions are more common in the middle period of life, and they have occasionally been met with in old age. They have been reported as early as the sixteenth month, and their first appearance has occurred as late as the thirtieth and even the fiftieth year after the date of infection. In some cases of tertiary syphilis of the larynx it is impossible to get any date of infection, and it may manifest itself without having been preceded by secondary symptoms. In these cases, the possibility of the disease being inherited should be borne in mind, although as a rule only the milder manifestations of syphilis are met with in congenital cases.

Morbid Anatomy and Pathology.—The earliest changes met with in the larynx, as a result of syphilitic infection, consist in hyperæmia and its results. That is to say, patches of the laryngeal mucous membrane become injected and swollen. These are often present when the secondary rash is on the skin and so assist in the diagnosis. Such hyperæmia differs in no way from ordinary laryngeal catarrh except in its persistency and the difficulty of curing it by ordinary means. Follow-

ing this a localised hyperplasia of the epithelium, attended with an infiltration of small cells, may take place, and a growth, to which the term of mucous patch, papule, or condyloma is variously applied, appears on the mucous membrane of the epiglottis, especially its lingual surface, on the posterior commissure, or on the vocal cords; or the opposite process may occur, and a superficial erosion be the result. If the local and general condition of the patient be of an unhealthy character, the erosion may pass into distinct ulceration, and this in its turn may give rise to œdema. The ulcers have a greyish-yellow base, with irregular edges, and are surrounded by a red zone.

Ulceration is the most common manifestation of tertiary syphilis in the larynx. The ulcer may commence as a superficial loss of substance, with a deeply inflamed margin, showing a great tendency to spread laterally, or, as is more frequently the case, it results from the softening and breaking down of a gumma. In the latter event, especially, the process has a tendency to extend deeply into the subjacent structures. If a vessel becomes eroded, serious hæmorrhage may be the consequence, and the loss of blood has been sufficient to cause death. Extending to the cartilages, the ulceration may give rise to perichondritis, caries, necrosis, and subsequent exfoliation of the necrosed cartilages. This process may take months, or even years. In some instances, perichondritis occurs without previous ulceration of the mucous membrane; if it proceed to suppuration, the abscess which forms may burst in any direction. The epiglottis is the usual seat of ulceration, and not infrequently it is entirely destroyed. The ulceration is, as a rule, unilateral, but it may extend in all directions. Should the crico-

arytenoid joint be involved, ankylosis may occur, as a result of which the vocal cord may be left fixed. Consequent upon the healing of the ulcerations, cicatrices form, and these may bring about stenosis of the larynx. This latter condition may also ensue, according to Semon, by a fibroid metamorphosis of a diffuse infiltration, which he recognises as one of the so-called tertiary manifestations, and in which the epiglottis, vocal cords or inter-arytenoid fold may be affected. Adhesions may also form between adjacent parts; thus, the epiglottis may become adherent to the posterior or lateral wall of the pharynx, or adhesion may take place between the vocal cords or the ventricular bands. In some cases, vegetations or papillary excrescences of a luxuriant character grow from the vocal cords, the inter-arytenoid fold, and other parts of the larynx, and may occlude the glottis.

The gummatous lesions which precede ulceration vary in size from a small bird-shot to a hazel-nut. If only one nodule be present, the surface is smooth; otherwise it is irregular. At first the gumma is hardly to be distinguished in colour from the normal mucous membrane, or possibly it has rather a redder tinge. Soon, however, it turns yellow in colour, softens in the centre, breaks down, and gives rise to the characteristic tertiary ulcer. Myopathic paralysis of the muscles of the larynx may occur in the later periods of secondary syphilis, and in tertiary syphilis at any period. As a rule, the affection is unilateral, and the left side is more frequently attacked than the right. The onset is often sudden, following exposure to cold and damp. As already mentioned, the vocal cords may be motionless, owing to mechanical fixation of the crico-arytenoid joints or to neighbouring cicatricial adhesions, or on

the other hand, the paralysis may be due to a peripheral neuritis or to more central causes.

Symptoms.—In the secondary stage the patient may complain of hoarseness, which sometimes passes on to complete loss of voice, and a feeling of discomfort in the throat, although pain is not often complained of, in fact the absence of the symptom is often characteristic of syphilis of the larynx. Occasionally there is an irritating cough. Neither dyspnœa nor dysphagia is present unless there be œdema. In tertiary syphilitic disease of the larynx, the symptoms are usually much more severe than those met with in the secondary stage, and not infrequently bring about a fatal issue. Impairment of voice and hoarseness are usually present, and dyspnœa, accompanied with stridor, occurs whenever there is a diminution in the lumen of the larynx, be it from œdema, vegetations, gummata, or cicatrices. In cases where the epiglottis has been ulcerated, there may be dysphagia, or if its substance has largely been destroyed, attacks of suffocation may occur from food entering the larynx. This, however, rarely happens, as patients are usually able to take food without discomfort, in spite of the entire loss of the epiglottis. If the gummatous infiltration give rise to great swelling, especially of the posterior wall of the larynx, deglutition will be interfered with; and if ulceration also exist, pain on swallowing will be present, and may radiate to the ear. Sudden death may arise from œdema of the larynx or from the impaction of a detached cartilage in the glottis. As a rule, however, the onset of suffocation is more gradual. In cases where the ulceration has laid bare a cartilage, a very offensive discharge will be coughed up, and, as a matter of course, the patient's breath will also be offensive. As already stated, a con-

siderable quantity of blood will be lost in the event of a large vessel becoming eroded.

The results of a laryngoscopic examination may be deduced from the description of the pathological changes met with in the larynx.

Complications.—It is now recognised that syphilis and phthisis may exist simultaneously in the same patient, and that an originally syphilitic affection may take on a tuberculous character; and (though this is less frequently observed), a phthisical ulceration may serve as a basis for syphilitic disease. The transformation of a tertiary syphilitic affection of the larynx into tuberculous disease is readily explained on the assumption that the tubercle bacillus enters the organism by the ulcerated surface, and finds a suitable soil in the syphilitic infiltration. Observations have convinced me (F. de H. H.) that tertiary syphilitic lesions in the larynx may, in very rare cases, be the starting point of malignant disease.

Diagnosis.—"Differential diagnosis between secondary and tertiary lesion is sometimes difficult, particularly in the transitional period especially described by Whistler. The discriminating characteristics are less well marked in laryngeal syphilis, perhaps, than in any other variety. It may, however, be broadly stated that secondary lesions, erythematous, papular, condylomatous or paralytic, are superficial; and that tertiary lesions are gummatous, ulcerous, carious, necrotic, and deep-seated. Laryngitis occurring within a few months of infection is almost invariably secondary. Lesions appearing before the termination of the third year are presumptively secondary; those appearing within the third year secondary, or transitional; and those appearing after the termination of the third year, tertiary.

Nevertheless, secondary lesions may be ulcerous, and undoubted tertiary manifestations have been recognised even within nine months of infection " (J. Solis Cohen). The colour of the mucous membrane is, perhaps, more dusky than in acute catarrhal laryngitis, and the mucous membrane has a more mottled appearance; but, in the absence of condylomata, there is usually nothing in the laryngeal affection of secondary syphilis, which would enable one to make a diagnosis with any certainty, should collateral information be wanting.

In the tertiary stage, the diagnosis has to be made from tuberculosis, lupus, leprosy, and cancer. The differential diagnosis from tuberculosis and lupus is discussed at pages 462 and 255. The absence of the cutaneous manifestations of leprosy and the history of the case will serve to exclude this disease. From cancer, the diagnosis is at first sometimes a matter of difficulty, but in this disease a new growth usually precedes the ulcerative stage, the progress is much slower, and pain is a more common symptom; still, some doubt so often exists, that it is advisable to subject the patient to a course of specific treatment, before definitely deciding against syphilis in favour of malignant disease. Even if the patient improves under treatment, it must be remembered that iodide of potassium, by causing absorption of inflammatory products round a malignant growth, may produce so much objective, as well as subjective, improvement as to be misleading. Again, syphilis and cancer are occasionally associated, and specific treatment may thus produce marked improvement for the time.

Prognosis.—This varies with the stage of the disease. The secondary affections of the larynx, though occasionally troublesome from their chronicity, give no

other cause for uneasiness; on the other hand, tertiary syphilis of the larynx may cause death from acute œdema, or the glottis may become suddenly obstructed by portions of cartilage which have exfoliated, or gradually stenosed by fibrotic changes occurring in the soft parts, or by the scarring which follows deep ulceration; or deep ulceration may extend into a large vessel, and give rise to fatal hæmorrhage.

Lastly, the dangers incident to stenosis of the larynx, and the consequent tracheotomy, must be borne in mind. Even after tracheotomy has been performed a hyperplastic process may extend from the larynx down the trachea, and eventually cause death. Though a gloomy picture has been drawn of the possibilities attendant upon syphilis of the larynx, nevertheless marked improvement may take place in cases apparently desperate, when they are subjected to anti-syphilitic treatment. Ulceration is often arrested, swelling disappears, and the normal outline of parts can again be recognised. In young children suffering from congenital syphilis there is an additional element of danger in the small size of the glottis, and the consequent great risk of death from asphyxia.

Inherited Syphilis.

That inherited syphilis is accompanied very frequently by affections of the larynx has been proved to demonstration. Owing to the early age at which the disease usually manifests itself, the use of the laryngoscope is neglected, and consequently many cases are overlooked. Barlow found it quite a common occurrence that syphilitic children, when first brought for treatment with snuffles, thrush, &c., had also a harsh,

weak voice; but as this rapidly improved under mercurial treatment but little attention was paid to it. Now these are just the symptoms which would indicate laryngitis; and, indeed, if the case be neglected, further changes take place in the larynx, which unmistakably prove the specific origin of the affection. There can therefore be little doubt that John Mackenzie, who has written an able paper based on 150 cases of throat syphilis of congenital origin, is justified in his statement that laryngeal disease is not rare in inherited syphilis, but that, on the contrary, it is one of the most constant and characteristic of its pathological phenomena, and that the invasion of the larynx is of as frequent occurrence in the inherited as in the acquired form of the disease. The most common period for the larynx to be affected is the first six months after birth. Laryngeal syphilis has even arisen during intra-uterine life. On the other hand, it must be remembered that it is quite possible for the symptoms to develop much later. Cartaz has collected twenty-seven cases of late hereditary syphilis, which occurred in patients varying from three to twenty-eight years of age; and as the appearances in the larynx do not differ materially from what is seen in acquired syphilis, the importance of recognising the possibility of the affection being of an inherited nature need not be insisted on.

Three chief forms of disease may be distinguished in inherited syphilis. In the first form the changes are superficial, and are limited to the mucosa and sub-mucosa. Under this category comes the class of cases which, as already mentioned, yield to treatment so readily that they are often disregarded. The second form is characterised by the occurrence of deep ulceration, which runs an acute course, the cartilages being

involved early. This is a very fatal manifestation of the disease; fortunately, however, it is of rare occurrence. In the third form, which is of a chronic nature, there is a gradual growth of dense fibrous tissue, which tends to cause contraction of the lumen of the larynx.

In the first variety, the symptoms referable to the larynx may be only slight, hoarse cough and cry being the most noticeable. Should the mucous membrane become swollen there will be dyspnœa, and possibly croupy attacks. In the second form the symptoms will be very grave; urgent dyspnœa comes on, in which inspiration and expiration are equally affected, voice and cry almost inaudible, and cyanosis supervenes. Death may occur in these cases with startling rapidity. In the remaining form, in which we have to deal with a hyperplastic syphilitic laryngitis, the symptoms come on more gradually—cough, huskiness of voice and cry, and increasing difficulty of breathing being the most characteristic. Death may occur suddenly, either from an attack of laryngismus or from œdema of the larynx. The laryngoscopic appearances of inherited syphilis differ in no respect from those met with in the acquired disease. They may be those of a catarrh of the larynx, or great thickening of the mucous membrane, accompanied with deep ulceration. In the hyperplastic forms the glottis may be reduced to a mere chink by the swelling of the mucous membrane, the change being especially marked in the epiglottis, the ary-epiglottic folds, and the inter-arytenoid fold. The occurrence of the disease—for the most part in infants—and the urgent symptoms which so frequently accompany it, will often render a laryngoscopic examination impracticable.

The *diagnosis* is seldom a matter of difficulty, as there are almost invariably other signs of syphilis present on the skin, mucous membrane of the mouth, throat, &c. The difficult cases are those in which the symptoms of inherited syphilis are first detected in an adult; but even here it is generally possible to arrive at a correct diagnosis by paying attention to other signs of inherited syphilis, such as the state of the nose, eyes, teeth, the presence of linear cicatrices at the angles of the mouth, and of ulceration of the skin and mucous membranes. Semon records a notable case of ankylosis of the left crico-arytenoid articulation with atrophy of the corresponding cord as a result of inherited syphilis.

Treatment.—In the laryngeal affection, which is one of the manifestations of secondary syphilis, constitutional treatment is most important. It is generally advisable in these cases to commence with mercury. This can be employed in the form of blue pill or grey powder, 1 or 2 grains being given two or three times a day, or the solution of the perchloride may be given in drachm doses in a bitter infusion, also two or three times a day. The combination of iodide of mercury and iodide of potassium (formula No. 26) is exceedingly useful in some cases. If mercury administered by the mouth disagrees with the patient, it may be introduced into the system by inunction. For this purpose half a drachm of blue ointment, or 20 grains of a five per cent. oleate of mercury ointment made with lanoline, may be rubbed in at night, first into one axilla and then into the other, so as to avoid irritating the skin. After a time iodide of potassium (formula No. 28) must be substituted for the mercury; but as the constitutional treatment of secondary syphilis of the larynx differs in no respect from a similar condition affecting other parts

of the body, for further particulars the reader is referred to any of the standard works on surgery.

Painting the larynx with astringent applications, such as formulæ Nos. 37, 41, or the weaker solutions of nitrate of silver, will assist in clearing up a syphilitic laryngitis. Schnitzler highly recommends inhalations of perchloride of mercury, 4 to 6 drachms of the solution (formula No. 40) to be inhaled from the steam atomiser daily.

The patient should be enjoined to use the voice as little as possible, and to abstain from alcohol, smoking, and everything likely to irritate the throat.

Cases of tertiary syphilis of the larynx sometimes require the most energetic treatment, in order to prevent death from suffocation due to the glottis becoming blocked through œdema, or sudden swelling of the soft parts. Though, as a rule, iodide of potassium, in doses of from 5 to 30 grains or even more, every six hours, will effect a speedy improvement, there are cases, and these usually the most threatening, in which the administration of mercury, as well as of iodide of potassium, is necessary. The patient should remain in bed, and the room be kept at an even temperature. Every four or six hours he should take 10 to 30 grains of the iodide, and twice daily 20 grains of blue ointment should be rubbed into the axillæ or inner side of the thighs. If urgent dyspnœa comes on, the application of a 20 per cent. solution of cocaine by means of the laryngeal brush will sometimes give relief; if not, it will, at all events, facilitate the process of intubation, which should be performed in preference to tracheotomy. In the absence of the instruments necessary for intubation, it will, of course, be necessary to do tracheotomy. The cannula should be removed as soon as

possible, as the longer it remains in the greater difficulty will there be in doing without it. The healing of chronic tertiary ulcers of the larynx is promoted by insufflations of iodoform or iodol, or by the application of a solution of sulphate of copper (formula No. 37). Vegetations may require the use of the curette, galvano-cautery, or galvano-caustic loop. The greatest care should be taken in preventing the formation of adhesions between the cords. When once the process has started, it sometimes goes on with such rapidity that the patient's life is endangered. The treatment of stenosis is considered at p. 486.

The treatment of inherited syphilis, as it affects the larynx, requires no special mention. In infants and children, the most effectual method of employing mercury is to spread 15 or 30 grains of blue ointment, diluted with an equal quantity of lard or vaseline, on a piece of flannel, which the child wears constantly round the abdomen, as recommended by Berkeley Hill. In young children local treatment of the larynx is, of course, impracticable.

19. STENOSIS OF THE LARYNX.

Diminution in the lumen of the larynx, either by changes in the walls of the larynx or by growth from within.

Ætiology.—Though stenosis of the larynx does not represent an independent disease, but is a condition brought about by very varied causes, devoting a separate section to its consideration will save repetition. Two forms may be distinguished—those running an acute, and those running a chronic course. Among the

former may be mentioned all acute inflammatory affections of the larynx, especially if coming on with the specific infectious diseases, and notably smallpox, typhoid fever, and diphtheria, acute septic inflammation of the pharynx and larynx, acute perichondritis, chemical and mechanical injuries, and the impaction of foreign bodies. By far the most frequent, and certainly the most persistent, form of chronic laryngeal stenosis is that produced by the cicatrisation, which results in the healing of tertiary syphilitic ulceration of the larynx. In inherited syphilis a chronic interstitial laryngeal inflammation occurs, which leads to great contraction of the lumen of the larynx. Stenosis is also a frequent result of malignant disease; but in these cases death usually occurs from exhaustion or hæmorrhage, as the stenosis does not attract much attention. In tuberculosis of the larynx, tracheotomy may at times be necessary to avert impending death from suffocation, usually brought about by œdema. Generally, however, destructive changes take place in the larynx, which are sufficient to maintain the patency of the respiratory tract. Lupus and leprosy may also lead to stenosis.

Stenosis is met with as a result of bilateral paralysis of the crico-arytenoidei postici, and in a bilateral affection of the crico-arytenoid joints, leading to fixation of the cords almost in the median line. Benign new formations sometimes attain sufficient size to nearly occlude the glottis. Amongst other ætiological factors may be mentioned membranous webs, chronic sub-glottic laryngitis, perichondritis, from whatever cause arising, and foreign bodies.

Morbid Anatomy and Pathology.—In acute diseases the narrowing of the lumen of the larynx is due

to infiltration of the mucous membrane with inflammatory products. In some cases the swelling may be almost entirely due to œdema. In syphilis, infra-glottic infiltration may be a cause of stenosis. The more characteristic examples of syphilitic stenosis are those in which a web is formed by the adhesion of the vocal cords or other parts of the larynx. At times a general hypertrophy of the structures at the level of the glottis occurs, whereby the aperture is much diminished. In cancer the obstruction is partly due to the new growth and partly to the collateral œdema. In traumatic cases the stenosis is usually dependent on the formation of a web-like membrane.

Symptoms.—The severity of the dyspnœa is the gauge of the amount of the obstruction, but with this proviso, that a rapidly advancing stenosis produces much more serious symptoms than one which is slowly developed; indeed, it is often a matter of surprise to observe with what little discomfort a patient can breathe through a glottis the diameter of which is not much larger than that of a quill.

Diagnosis.—The only difficulty in making a diagnosis is that to which attention is directed under the head of bilateral paralysis, viz., the possibility of a double stenosis—*i.e.*, a stenosis in the trachea as well as one in the larynx (See p. 528). Two examples of this have occurred in patients under my (F. de H. H.) care. The one occurred in a case of aneurysm of the ascending and transverse portions of the arch of the aorta pressing on the trachea, and causing at the same time bilateral abductor paralysis; the other in a man whose vocal cords were firmly adherent by a thick web. In this case the hyperplastic process extended into the trachea, so that, notwithstanding tracheotomy, the patient died.

Prognosis.—The only cases of stenosis which offer a prospect of cure are the syphilitic and traumatic. The former require the most persevering and systematic treatment; and even when a fair amount of dilatation has been attained they are very liable to relapse. Whenever extensive cicatricial contraction has taken place, treatment can only be palliative; on the other hand, if the obstruction be narrow and membranous, the prospect of success is much greater. According to Cohen, if the stenosis be caused by adhesions between the arytenoids, dilatation never affords permanent relief.

Traumatic are more hopeful than syphilitic cases.

Treatment.—As has already been stated, stenosis of the larynx may come on suddenly, or develop gradually. For the former tracheotomy or intubation may have to be performed, and generally speaking the preference should be given to intubation where this is possible; but the cases of laryngeal stenosis which run a more chronic course require to be treated in a different manner. The simplest case of stenosis to treat is that due to the presence of a web or membrane between the vocal cords. As a rule, this can be excised by an intra-laryngeal operation, and if the vocal cords are prevented from again becoming adherent, by the occasional passing of hollow bougies, a good result is obtained.

It is in cases of stenosis of a syphilitic nature that the greatest difficulty in effecting and keeping the dilatation permanent occurs. To Schroetter must be assigned the credit of introducing the methodical treatment of laryngeal stenosis by dilatation. This plan of treatment consists of two distinct methods:—

1. The introduction of hollow tubes into the larynx previous to the performance of tracheotomy.

2. Dilatation after tracheotomy has been performed.

The tubes invented by Schroetter for the first method are made of vulcanite, are of a triangular shape, and curved so as to correspond to the interior of the larynx.

Before attempting to introduce an instrument, the larynx should be painted with a twenty per cent. solution of cocaine. If the stenosis be at all extreme, it is advisable to accustom the patient to the use of instruments by beginning with an ordinary flexible catheter, No. 3 or 4. Any instrument employed for dilatation should be smeared over with carbolised vaseline. The



FIG. 70.—Schroetter's Laryngeal Dilators (six sizes).

tube should be lightly but firmly grasped between the index and the middle finger of the right hand above, and the thumb below, and introduced into the larynx under the guidance of the mirror. If the cords are still intact they may offer some resistance to the passage of the tube, but when the patient inspires the cords separate, and the tube can be pushed down through the stenosed part of the larynx. At the first two or three sittings it is not desirable to leave the tube in for more than a few seconds, but as the parts become more tolerant, it may be left in for five to thirty minutes at each sitting, according to the amount of discomfort it

causes the patient. The tube should be introduced daily, and gradually left in for a longer period. As soon as the tube passes quite easily a larger one should be substituted; but the dilatation should be carried out very slowly, so as to avoid the risk of setting up inflammatory mischief in the larynx. After a period, varying from weeks to months, the tubes need be introduced only on alternate days, then twice a week, and finally, when complete dilatation has been effected, passing a tube once or twice a month may suffice to prevent con-

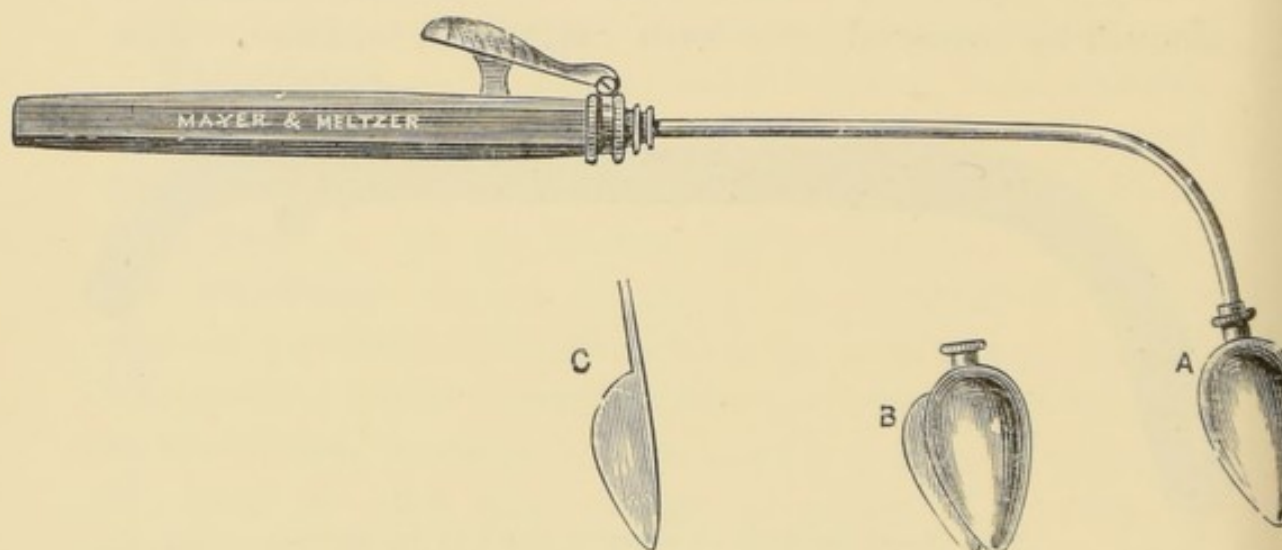


FIG. 71.—Whistler's Cutting Dilator.

traction occurring. This method of treatment, to be successful, requires the greatest amount of patience and perseverance on the part both of patient and doctor. In some cases of adhesion between the cords Whistler's cutting dilator will be found to act admirably (fig. 71). It is easily introduced into the larynx; and by putting the tissues on the stretch before the incision is made, it enables this to be carried out with more precision than if it were effected by the knife alone.

After tracheotomy has been performed there are two chief methods of dilatation: (1) by instruments intro-

duced through the mouth; (2) by instruments introduced through the tracheal opening.

Thanks to the exertions of Schroetter, the former method is the one now commonly employed. He uses tin bolts of a triangular shape, so as to correspond to the interior of the larynx. The bolt, to which a piece of string is attached, is introduced through the glottis by means of a suitably curved rod, and when it is placed in the proper position, the rod can be withdrawn, and the loop of string secured round the patient's ear. When required, the bolt can be removed by means of the string.

As regards the method of dilating the stenosed larynx by instruments introduced through the trachea, it has only this in its favour, that it can be carried out by a surgeon who is unskilled in the technique of laryngology.

Newman has successfully treated cases of complete stenosis produced by suicidal wounds of the larynx, by tents of tupelo wood dragged up into the larynx, through the tracheotomy wound, by means of a cord.

In the narrow, undilatable, and callous form of stricture, such as is met with after extensive syphilitic ulceration and as a sequel of typhoid ulceration, for which tracheotomy has already been performed, treatment by dilatation is not likely to be successful. In these severe cases laryngo fissure and the division of the stricture are indicated, and there need be less hesitation in advising this because the power of phonation is probably already destroyed. At the time of the operation the tampon cannula should be employed, to prevent blood entering the trachea; any cicatricial bridles should also be cut through, and granulation tissue may be removed. In still more severe cases

resection of portions of the larynx will be necessary to afford sufficient space for breathing. A suggestion has been made that in cases of bilateral paralysis of the abductors the larynx should be opened, and the vocal cords removed. But, as Semon has pointed out, relief to the laryngeal dyspnœa would be dearly bought at the incurable and complete loss of voice, which must necessarily follow such an operation. The usual practice of performing tracheotomy in such cases, and providing the patient with a valve to the tube, which enables him to speak without closing the opening with his finger, is surely much better. Trendelenburg points out that after tracheotomy has been performed for stenosis, in course of time an additional factor in preventing the removal of the cannula comes into play—namely, the impaired power of the abductors of the vocal cords. During deglutition the adductors are called upon to close the glottis while the abductors are at rest, owing to the breathing being carried on through the cannula. Hence the importance of removing the cannula as soon as possible. In some cases the orifice of the tube may be plugged for a short time daily, in order to compel the patient to breathe through the mouth. The length of time the plug is in may be gradually increased, until the patient acquires confidence to dispense with the tube.

20. INTUBATION OF THE LARYNX.

In the treatment of acute stenosis threatening death from asphyxia, the choice rests between tracheotomy and intubation. For the mode of performing the former, reference must be made to surgical textbooks.

The instruments devised by O'Dwyer for intubation consist of a gag, five laryngeal tubes, each tube having a separate obturator, an introducer, an extractor, and a gauge (fig. 72). There is nothing special to be noted about the gag. The tubes vary in length from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches, the calibre of the largest being about $\frac{1}{4}$ inch by $\frac{1}{8}$ inch; that of the smallest is about half this size.

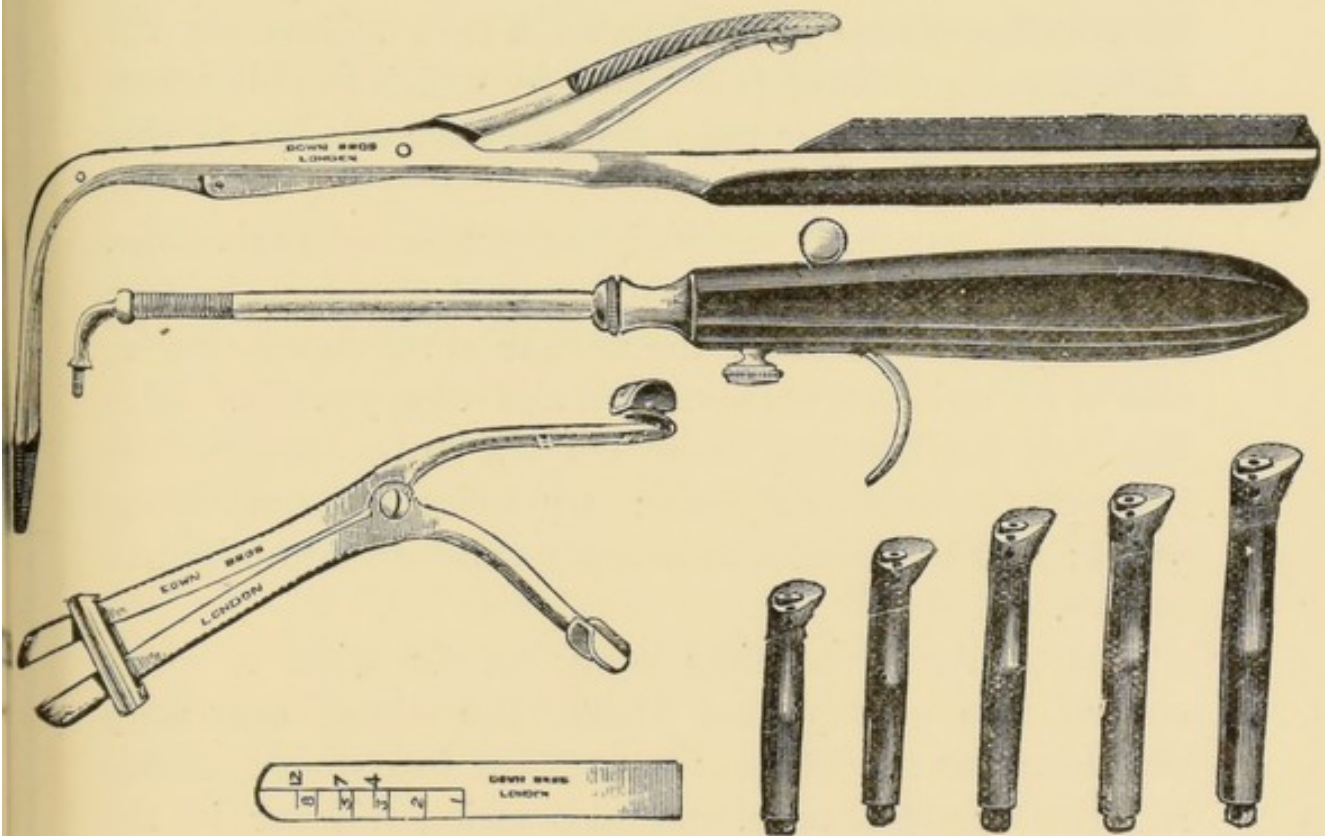


FIG. 72.—O'Dwyer's Intubation Instruments.

The tubes are of brass, gold-plated. At the upper end of the tube is a diamond-shaped head, with rounded edges; this rests on the ventricular bands, and prevents the tube slipping down into the trachea. The anterior part of the tube, where it rests against the epiglottis, is bevelled off, and in the anterior angle is a hole through which a thread is passed. The tube itself is fusiform in shape, so as to prevent its being expelled

too easily from the larynx. The distal extremity of the tube is rounded off. To each tube is fitted a jointed obturator, which exactly closes the openings at each end of the tube, projecting slightly below the lower one. At the upper end of the obturator is a hole, into which the point of the introducer screws. The introducer consists of a handle and a metal shank, the distal extremity of which is bent at right angles. By pressing on a button placed in the handle, a tube sliding on the shaft presses forward two claws, by which the obturator can be detached from the laryngeal tube as soon as this is *in situ*.

On the gauge is marked the length of each tube. The smallest tube reaches to line 1, and is for children of one year and under; the next tube reaches to line 2, and is for children between one and two years of age; the line marked 3-4 indicates the tube for children between two and four years; 5-7 is for the next three years; and the largest tube is for children from eight to twelve.

The extractor consists of a handle with a shaft curved like a laryngeal brush, the distal extremity of which has two blades; these are introduced closed into the laryngeal tube, and on pressing a lever in the handle the blades open out, and come into contact with the inner surface of the laryngeal tube, which can then be withdrawn.

The Method of Performing Intubation.—The first thing to be done is to choose a tube suitable to the age and size of the child; the larger the tube that can be introduced the better for the patient. The tube should then be threaded with stout silk thread about half a yard long, and the ends tied together. The introducer should be tested to see if it works smoothly.

The child is wrapped in a shawl so as to secure the arms, the nurse sits in a high-backed chair, takes the child on her lap, and lets his head rest against her left breast, places her arms round him, and holds his wrists; an assistant introduces the gag at the left corner of the mouth and steadies the patient's head. The operator takes the suitable tube with its obturator already fixed in the introducer, and inserting the index finger of the left hand in the child's mouth, he passes it rapidly backwards until he can feel the epiglottis and the arytenoid cartilages; guided by the index finger, he then passes the tube into the glottis. The handle of the introducer is at first held parallel to the sternum. When the tube approaches the pharyngeal wall the handle is elevated, otherwise the tube would enter the œsophagus. The entrance of the tube into the larynx is indicated by cough and expectoration. No force should be employed, as it is never necessary. As soon as the tube is in position the obturator should be detached from it and withdrawn, and the gag removed. After waiting a few minutes for the child to clear the trachea, and to get free of the dyspnœa which accompanies the introduction of the tube, the gag is again placed between the teeth, and the silk thread cut through; the finger is then passed down to the head of the tube, and the thread withdrawn. In introducing the tube no pain should be inflicted on the child; and if the attempt be not at once successful it is better to give the patient a little rest before trying again.

When it is considered desirable to remove the tube, the child is placed in the same position as for its introduction, and the gag inserted. The extractor, under guidance of the index finger of the left hand, is passed backwards and downwards until the tip can be directed

into the opening of the laryngeal tube. When this is satisfactorily accomplished, the lever in the handle is pressed, which causes the blades to dilate, and thus firmly fix the tube, which can then be removed. Should difficulty be experienced in its removal, it may be necessary to administer an anæsthetic.

The operation of introducing the tubes is at times by no means easy, especially if the child be refractory. There is also another difficulty—viz., that the tube may force down membrane, and so block the trachea, and thus necessitate tracheotomy. It is, therefore, advisable to be prepared to perform the latter operation if required. If, after the performance of intubation, dyspnœa continue, or if there be an increase in the frequency of the respiration, this indicates the existence of some complication, or extension of the disease below the tube.

As regards the after treatment of cases of intubation, the question will arise, how long is the tube to be left in? The answer given is that it should be extracted on the fourth to the sixth day in all cases, and if there be dyspnœa it should be replaced. Should the tube become blocked by membrane before this, it will probably be expelled by a fit of coughing, and will require to be reintroduced.

The great drawback of intubation, however, is the difficulty of feeding the patient. Soft solids are usually readily taken, but fluid is apt to enter the larynx and set up cough. Two methods of supplying the patient with liquids have been found to obviate this difficulty. In one the child is placed on his back across the nurse's lap with the head dependent and then allowed to suck fluid out of an ordinary feeding bottle. In the other method the child is placed on its abdomen across a

sofa, with the head hanging over the edge, and is then told to suck fluid out of a mug on the floor by means of a tube. If neither of these plans succeed the child may be fed through a nasal tube.

The chief dangers of intubation are:—

1. The tube may be coughed up and death by asphyxia may occur before it can be replaced. This is a rare accident.

2. On introducing the tube it may push down some false membranes in front of it and occlude the trachea, this occurred three times in 209 cases; the tube, however, can be immediately removed by pulling on the thread, and then reinstating it.

3. Plugging of the tube with false membrane nearly always results in its being coughed out; if it should be swallowed no harm seems to result as it passes out per anum in due course.

According to Waxham, intubation has the following advantages over tracheotomy:—

“1. It can be performed by the expert quickly, almost instantly.

“2. There is no loss of blood to further prostrate the patient.

“3. There is no injury to the soft tissues, and little or no pain.

“4. There is no shock from the operation.

“5. There is no danger from septicæmia, or from erysipelas, as from an open wound.

“6. There is very little irritation from the tube, much less than from a tracheotomy tube.

“7. There is no open wound to close by slow granulation.

“8. The air enters the lungs through the natural passages.

"9. Recovery is rapid after the removal of the tube.

"10. We can do with less skilled attention than after tracheotomy.

"11. Consent of parents is much more easily obtained.

"12. We can save as large a proportion of cases as by tracheotomy at all ages, and a much larger proportion among children less than three years of age."

It is probable that intubation will be more frequently used in this country now that the anti-toxin treatment is practically universal, because there is less likelihood of the membrane spreading below the larynx.

If, as Gee remarks, we could be sure that the disease was confined to the larynx and would not spread beyond it, intubation would be reasonable treatment, but, unfortunately, the laryngoscope gives little information in children even when used by an expert, and hence intubation may quite possibly have to be followed up by tracheotomy, in which case the result is very often fatal.

In comparing the amount of attention required by a child who has been intubated, with that required by one who has been tracheotomised, it must be remembered, that so long as the intubation tube remains in the larynx, the only care the child requires is in feeding. Unfortunately at any moment the tube may be expelled by a fit of coughing, and it can only be replaced by the doctor. In this respect intubation is at a disadvantage as compared with tracheotomy, because if the tracheotomy tube should by chance slip out, the nurse can usually replace it easily; otherwise, the treatment after tracheotomy requires much greater skill and attention than after intubation. On the other hand, the latter operation, especially when performed early allows of

local treatment being applied to the trachea and larynx and so reduces the absorption of the diphtheria toxins upon which the gravity of the disease depends. Again the length of the after treatment must be remembered. In intubation the tube is seldom required longer than from four to nine days, and in no case has twenty-one days been exceeded. After tracheotomy the tube may have to be worn for weeks or even months. Provided the medical attendant feels competent to perform tracheotomy, and is equally adept in the manipulations required for intubation, it would be desirable for him to adopt the latter method first, especially in children under four years of age, where the statistics of intubation are more favourable than those of tracheotomy, and especially if a full dose of anti-toxic serum has been injected early in the treatment of the case.

Besides its great use in diphtheria, intubation has been successfully employed in other conditions of acute stenosis of the larynx—as, for instance, in scald of the larynx, œdema of the larynx, acute laryngitis, and sudden spasm of the glottis.

Intubation in Chronic Stenosis of the Larynx.

O'Dwyer, at the ninth International Medical Congress in 1887, read notes of five cases of chronic stenosis in which intubation was successfully carried out. The tubes provided in the intubation case are designed for children. If, therefore, adults are affected, special tubes must be employed. The series consists of ten tubes. The larger ones are made of hard rubber, the medium of brass gold-plated, with vulcanite heads; the smaller tubes are made of metal only. The introducer and extractor are larger and stronger, and with a longer

curve than the instruments used for children. If practicable, there can be no doubt that intubation offers the patient the best chance of complete recovery. The immediate effect of tracheotomy is usually to cause an increase in the amount of laryngeal obstruction, as the dilating effect of the current of air passing upwards and downwards is lost. On the other hand, in intubation the presence of the tube not only tends to maintain the size of the lumen of the larynx, but it also frequently causes some enlargement. Again, intubation may tide the patient over the dangerous time, and so give an opportunity for anti-syphilitic or other treatment to act. In one of O'Dwyer's cases the tube was worn continually for ten months and four days, thus demonstrating that it may be worn for almost an indefinite period without serious inconvenience and without becoming obstructed. O'Dwyer says that he has never found it necessary to remove a tube from an adult larynx for the purpose of cleaning, as is sometimes necessary in children. The patient becomes aware of any accumulation of mucus, and expels it by a voluntary act of coughing. Adults experience the same difficulty as children in swallowing after intubation, and solids are more readily swallowed than fluids. There is considerable difference in the power of swallowing. Some patients can do so very well from the commencement, whilst others have the greatest difficulty until the tube has been in for some time. The length of time that the tube is allowed to remain in the larynx depends on the amount of irritation and interference with deglutition which it produces. Intubation has also been found of great service in cases in which, after tracheotomy, restoration of breathing by the natural passage had previously been found impossible.

Pitts has put on record four cases in which, after removing cicatricial and granulation tissue, he has been enabled to intubate, and eventually to remove the tracheotomy cannula.

In using intubation tubes for the purpose of dilating a stenosed larynx, the same rule holds good as in treatment by Schroetter's plan, viz., that the dilatation should be effected slowly and gradually. At the commencement the smallest tube that will admit of easy respiration, and which fits the larynx without becoming impacted, should be employed, so as to allow of a certain amount of movement during the act of deglutition. Intubation in adults is, in one respect, more difficult than in children, in consequence of its being often impossible to reach the epiglottis with the index finger; hence the aid of the laryngoscopic mirror may be necessary for the introduction of the tube, but the index finger of the left hand will be required to push the tube into the laryngeal cavity. In extracting, too, the mirror will usually be of service. Again, in the case of children with diphtheria, no force need be employed, but in the case of chronic stenosis a considerable amount of force may be required to introduce the tube into the narrowed glottis.

Thorner has recorded a case of chronic laryngeal stenosis for which he employed intubation. The tube was removed at the end of about fifteen hours, at the patient's request. The patient died a few minutes after he left Thorner's office. The explanation of the accident is best given in Thorner's words. "After the pressure exercised for fifteen hours by the tightly fitting tube upon the infiltrated tissues had been suddenly relieved, a sub-glottic œdema ensued, causing a fatal issue within a short time." The lesson to be deduced

from this case is the necessity of keeping the patient under supervision, for some time after the removal of the intubation tube, in cases of chronic laryngeal stenosis.

21. CICATRICIAL AND CONGENITAL MEMBRANES.

The vocal cords are occasionally found united by a membrane, or web, as it has been termed. This condition may be of congenital origin, or it may result from inflammatory mischief, giving rise to adhesion of the cords. In the latter case syphilis is almost invariably the cause.

Vivian Poore exhibited at the seventh International Medical Congress, London, a good example of the former condition. The patient was a healthy girl, aged thirteen. The anterior thirds of the vocal cords were united by a web, "perfectly symmetrical, smooth, and apparently covered by healthy mucous membrane." Semon has also published a similar case in which the laryngeal web was associated with coloboma iridis.

The congenital cases are best treated by dividing the membrane with the galvano-cautery, though the simple knife may be used. Re-adhesion is to be prevented by the use of Schroetter's tubes.

The treatment of acquired adhesions will be found described under the head of "Stenosis of the Larynx" (see p. 486).

22. PROLAPSE OF THE VENTRICLE.

By this term is understood the protrusion of the mucous membrane lining the sacculus laryngis, or ven-

tricle of Morgagni, so that it becomes visible between the ventricular bands and vocal cords. Some writers make a distinction between prolapse and eversion, but the one passes into the other by such insensible gradations that the distinction is unnecessary.

Ætiology.—Prolapse of the ventricle is favoured by a relaxed condition of the mucous membrane. Hence it may occur in connection with tuberculosis, cancer, syphilis, or any chronic catarrhal condition leading to hypertrophy of the mucous membrane. Gougenheim reports five cases of prolapse, tuberculosis being present in four. Shallowness of the ventricle is also a predisposing cause. The usual exciting cause is an attack of violent coughing, but it has been known to follow a blow upon the larynx. It is curious that of ten reported cases in which the side affected was mentioned, in two it was bilateral, and in the remaining eight it was always the right side on which the prolapse occurred. It is highly probable that some of the cases hitherto regarded as prolapse of the ventricle are in reality due to the growth in, and projection from, the ventricle, of a tongue-like excrescence similar in structure to the adjacent ventricular band.

Such a growth might readily become the site of tubercular deposit in a predisposed subject. Smaller spurs and excrescences are by no means uncommon in the ventricles.

Symptoms.—In unilateral cases alteration in the voice is the usual, and sometimes the only symptom; the prolapsed mucous membrane, by getting between the cords, may prevent their approximation, and lead to aphonia. Occasionally pain is complained of, and in bilateral cases the obstruction may be sufficient to cause dyspnœa.

On laryngoscopic examination the larynx will usually be found hyperæmic. In well marked cases a swelling, directly continuous with the ventricular band, obscures, more or less completely, the vocal cord, and the entrance into the ventricle is obliterated. The swelling resembles in colour the normal mucous membrane of the larynx, it is smooth and soft, and can be partly replaced, for a time, by pressure with the probe. The prolapse may at first be small, and may gradually increase in size. A case is recorded in which the prolapse appeared as six smooth, round, bright red tumours, one of which was of the size of a cherry, and the others the size of a pea. By pressure the smaller tumours could be made to disappear between the ventricular band and vocal cord.

Diagnosis.—Prolapse of the ventricle has to be differentiated from new growths, chronic hypertrophic catarrh of the larynx, and abscess. The situation of the tumour should, in the first place, suggest its possible nature. The absence of the line of demarcation between the ventricular band and the ventricle, the possibility of replacing the prolapsed mucous membrane, and the speedy recurrence of the eversion on coughing, should suffice to prevent a mistake being made.

Treatment.—In the first place, the general catarrhal condition of the larynx will require treatment by astringents. Remedies should be ordered to relieve the cough, and the patient should be advised to use his voice as little as possible. If, in spite of these measures, the tumour, after it has been replaced, continues to prolapse, attempts should be made to reduce its bulk by the application of chromic acid or the galvano-cautery, or the prolapsed portion may be removed by suitable

forceps. Jelenffy recommends that two or three small incisions should be made into the prolapsed part daily, along the border of the ventricular bands, commencing anteriorly. By these incisions the nutrition of the prolapsed part is prevented, and it is thus caused to shrink. He succeeded in curing one case in ten days by this plan. In a case recorded by Lefferts, thyrotomy was performed and the prolapsed mass removed. The operation was followed by relief to all the symptoms and restoration of voice.

23. FRACTURES OF THE LARYNX AND HYOID BONE.

Fractures of the larynx and hyoid bone can be caused by direct force, as by the blow of a fist, more especially if the cartilages have lost their elasticity. They can also be caused by compression or traction, as in garrotting, or in cases in which a handkerchief worn round the neck is caught in a machine. Attempts at cutting the throat with a blunt instrument may likewise cause fracture. Instances of the fracture of the right cornu of the hyoid bone and of the right wing of the thyroid cartilage, as the result of muscular action, have been recorded. Arbuthnot Lane's examination of about 100 dissecting-room subjects revealed the existence of fractures of the larynx and hyoid bone in at least nine per cent., after the exclusion of all doubtful cases. The above figures prove that these fractures are not always accompanied by severe and characteristic symptoms, and they must consequently be frequently overlooked. Lane's observations are in striking contrast with the results of clinical experience. Durham stated that out

of 69 cases of fracture of the larynx and hyoid bone which he had collected, 53 ended fatally; and he added, "It is worthy of special note that every case (28 in number) in which the cricoid was fractured proved fatal." Three cases of recovery, after fracture of the cricoid, have been recorded. Among Lane's specimens, however, there was certainly one, and probably two, examples of fracture of the cricoid cartilage. This discrepancy between the results of post-mortem examination and clinical experience has yet to be explained.

Fracture of the upper cornua of the thyroid, which, according to Lane's figures is the most common of all the fractures, can be produced with comparative ease by a combination of lateral compression and backward pressure.

Symptoms.—In the less severe cases, after a blow or other violence to the larynx, the patients complain of pain, which is sometimes increased on swallowing, especially if the food be solid; and there may be some alteration in the voice, the patient only being able to speak in a hoarse whisper. Should the injury be more severe, a choking sensation may be complained of, the breathing may become at once difficult and accompanied by cough with bloody expectoration. The patient may hardly be able to speak at all. Cyanosis, and subcutaneous emphysema extending all over the neck and trunk, have been recorded in some cases. If the patient survives the immediate shock, there may be purulent and very foetid expectoration, in which pieces of necrosed cartilage may sometimes be detected. On manipulating the larynx, which process greatly intensifies the patient's sufferings, the nature of the fracture may sometimes be detected, and crepitus felt. On laryngoscopic examination, usually performed

with difficulty, the configuration of the larynx may be found to be much altered. In one case two red swellings, corresponding to the superior edges of the thyroid cartilage, filled the whole of the interior of the larynx.

Treatment.—If the fracture be at all extensive, and accompanied by dyspnœa, tracheotomy should be at once performed, even though the symptoms are not very urgent. Roe goes so far as to say that tracheotomy should be performed immediately after the injury in all cases. After tracheotomy has been performed, attempts may be made to place the broken parts of the larynx in as favourable a position as possible. Subcutaneous emphysema may require to be relieved by puncture.

In less severe cases endeavour must be made to keep the larynx quiet by the application of strapping, abstinence from speaking, and feeding the patient per rectum. At the same time the external application of an ice bag to the larynx, or Leiter's tubes, with sucking of ice pellets will tend to reduce the inflammatory swelling, which is such a dangerous feature in these cases.

24. OTHER INJURIES TO LARYNX.

In addition to fractures and dislocations of the larynx, there may be punctured, incised, gunshot wounds, or other injuries. Semeleder records an unique case. A woman was stabbed in the throat with a stiletto; there was but little hæmorrhage, and the patient made a good recovery, except that she remained hoarse. On laryngoscopic examination the left vocal cord was found completely divided transversely.

25. DISLOCATION OF THE THYROID HYOID ARTICULATION.

Occasionally the ligaments connecting the greater horns of the hyoid bone with the superior cornua of the thyroid cartilage become so relaxed, as to allow of abnormal movement of the hyoid bone on the thyroid cartilage. In one case Gibb at the post-mortem found an abnormal pouch or synovial capsule around the thyro-hyoid articulation, which permitted of an extraordinary amount of movement. One of us (F. de H. H.) has seen two examples of this condition. The first case was sent to him by Dr. Davidson, of Nottingham. The patient, a man of thirty-one, stated that, after a violent attack of vomiting, he felt intense pain in the throat, which lasted some hours. Since then he had had the sensation of something being out of place in the throat on the left side, and he felt a click on swallowing. On pressing over the right side of the hyoid bone, the bone could be felt and heard to slip, and this movement caused the patient pain. On laryngoscopic examination nothing abnormal could be detected. When the patient was seen five months later there was a distinct swelling of the left thyro-hyoid articulation to be felt, and he complained of some difficulty in swallowing.

The second case was that of a lady, thirty-four years of age. The first attack of displacement took place thirteen years ago, and from the account she gave it is clear that the condition lasted twenty-four hours. The pain was so great that she fainted. She stated that the attacks came on about twice a year, and they last from a few minutes to thirty-six hours. They have usually occurred when she was laughing. She feels something

click on the left side of the throat, and has great pain in swallowing, even saliva. The attacks always end with the feeling of something slipping back into its place. A sneeze or a choking attack may determine this. On moving the hyoid bone laterally on the thyroid cartilage distinct grating could be felt on the left side.

Gibb describes two cases. One was on the left side, and the other was bilateral. It is a curious coincidence that of the six cases to which reference has been made, in five the displacement took place on the left side, and in the remaining case it was bilateral. These cases have been detailed at rather greater length than perhaps the importance of the subject requires; but Lane appears to throw a doubt on their nature, and, as the author's personal experience agrees with Gibb's, it has been thought well to put them on record.

Treatment.—Gibb recommended the treatment employed by Dr. Ripley in his own person. "It consisted in throwing the head backward as far as possible, so as to place the muscles of the neck upon the stretch, then relaxing the lower jaw, when the displacement becomes reduced, after a few attempts, with a click, at the same time gently pressing or rubbing over the displaced part."

Luxation of Crico-thyroid Articulation.

Braun has directed attention to luxation of the crico-thyroid articulation—he is himself a sufferer: "The luxation of the inferior horn of the thyroid cartilage forward from its articulation with the cricoid cartilage, occurs during deep inspiration, and more frequently during yawning."

26. FOREIGN BODIES IN THE LARYNX.

The list of foreign bodies which have passed into the larynx is now a very lengthy one, and contains all kinds of articles. Among the most numerous may be mentioned pieces of food, seeds, beans, nutshells, buttons, marbles, bullets, pebbles, pieces of money, pins, needles, pieces of glass, wood, crockery, teeth (both artificial and natural), fragments of nasal or naso-pharyngeal polypi and tonsils, leeches, and worms, such as ascarides. In America, cockle-burs seem to possess a particular facility in finding their way into the larynx.

Mode of Entrance.—Foreign bodies which enter the larynx generally do so by way of the mouth. Durham points out that “as a rule, the foreign body is drawn in from the mouth by a strong, sudden, ill-timed, or unguarded respiratory act.” If, while eating, or when there is a foreign body in the mouth, the person talks, laughs, or coughs, there is always the possibility of the object entering the larynx during the inspiration which precedes these actions. Hence, children, and partially drunken or insane people, are more liable to this accident than others; also persons whose teeth are defective, or altogether absent, so that the food has been imperfectly masticated. The cases on record of suffocation during a meal are now so numerous, that the symptoms should at once draw attention to the probable cause. Yet, from time to time, in the post-mortem room, the larynx is found blocked with some article of food, the mode of death having been previously not suspected. The loss of sensibility of the laryngeal mucous membrane, which attends bulbar and

diphtheritic paralysis, favours the entrance of foreign bodies into the larynx.

Food, after it has entered the stomach, may be vomited, and, becoming impacted in the larynx, cause sudden death. Hence the necessity of administering anæsthetics on an empty stomach. Lumbrici make their way into the stomach, and thence pass into the pharynx and larynx.

Situation.—Though external to the larynx, it will be convenient to include the pyriform sinus in the enumeration of the situations in which foreign bodies have been met with. Indeed, this sinus is one of the commonest spots for the body to be arrested in its downward course.

Pins, needles, and other small, pointed bodies not infrequently transfix the ary-epiglottic folds; flat and irregular bodies, such as pieces of bone, generally get caught about the level of the vocal cords; soft substances, such as pieces of meat, too large to pass through the glottis, are usually found impacted in the larynx; coins, beads, buttons, and other rounded bodies, often pass into the ventricles of the larynx. At a post-mortem at the Westminster Hospital, on a child brought in dead, the tube of a toy balloon was found projecting between the vocal cords, and the distension of the balloon, on the expiratory act which followed its entrance, had effectually blocked the larynx.

The exact position of the foreign body may be most important from a medico-legal point of view. Thus, a case is reported in which a cork was found tightly inserted into the larynx. It was suggested that the deceased, whilst extracting the cork from the bottle with her teeth, might have had it driven, by the sudden impetus of the contained fluids, into her larynx. This

theory, however, was negatived, as the sealed end of the cork was found uppermost in her throat. The medical opinion was that the cork must have been forced into the throat by another person while the woman was helpless from intoxication.

Symptoms.—If a foreign body impacted in the glottis be sufficiently large to entirely occlude it, the symptoms of suffocation come on immediately, and if the person be not relieved within the space of one or two minutes at the outside, death will speedily occur. Sharp pointed or jagged bodies, by the irritation they produce, may excite spasm, and thus cause death almost as speedily as in the cases of complete occlusion.

If death does not at once supervene upon the entrance of the foreign body, the symptoms will be modified by its size, character, and situation. Other things being equal, the greater the bulk of the foreign body, the greater will be the dyspnœa. In nearly all cases where suffocation is not immediately produced, violent fits of coughing and laryngeal spasm occur. The amount of pain depends upon the character of the foreign substance; if it be sharp or jagged, there is usually severe pain, which is increased by the cough, so frequent an accompaniment of these cases, and by swallowing; the breathing is usually stridulous, urgent attacks of dyspnœa not uncommon, and the voice is hoarse, or even lost. On the other hand, a small round body may become lodged in one of the ventricles and give rise to hardly any symptoms. During a course of operations on the cadaver laryngotomy was performed. On opening the larynx, a one-mark piece was found in it, and there was also perichondritis of the thyroid cartilage. The patient had suffered from chronic phthisis, but, except for hoarseness, had never ex-

hibited any symptoms of the presence of a foreign body. Massei draws attention to the fact that a foreign body may penetrate into the windpipe without any sign, and without the knowledge of the individual, even though he be an adult in full possession of his senses. If a leech finds its way into the larynx and attaches itself to the mucous membrane, spitting of blood is usually a marked symptom.

Semon's case of the removal of a pin from the larynx of a boy, in which it had been impacted for thirteen months, is a striking example of the damage which may be wrought by the presence of a small but sharp foreign body in the larynx. In this case, there was immobility of the whole of the left half of the larynx from the inflammatory mischief set up by the pin. As an example of the length of time a foreign body may be retained in the larynx, may be mentioned a case recorded by Ravenel. A boy, seven years of age, swallowed a needle. For twenty-four years his health was unaffected; then his voice became hoarse, he had a chronic cough, and lost flesh. Fourteen years later, he had a violent fit of coughing, and brought up a hard, black object, imbedded in a mass of mucous secretion, which proved to be the long lost needle. Laryngoscopic examination, then made for the first time, showed that the needle had lain across the larynx with its ends imbedded in either ventricle.

Diagnosis.—If a laryngoscopic examination be practicable, and the foreign body can be seen, there is, of course, an end to all doubt; but cases are constantly occurring in which patients assert that they have swallowed something, and point to the larynx as the seat of their discomfort. With very few exceptions patients who have swallowed a foreign body give a

very definite history of violent coughing and laryngeal spasm. In some instances, the foreign body has entered the larynx and been again expelled and swallowed, but not before it has bruised or scratched the mucous membrane. Time will generally suffice to clear up these cases ; occasionally, however, in neurotic patients, the sensation remains after the cause has been removed.

On the one hand, a child may be taken suddenly ill with symptoms of laryngeal stenosis, and if he should chance to have been playing with beads or buttons shortly before, the suspicion of a foreign body being in the larynx may be excited. A careful inquiry into the history of the case, the condition of the fauces, and the presence or absence of pyrexia, ought to prevent a mistake being made. On the other hand, cases have been reported in which children have presented none of the usual symptoms characteristic of the entrance of a foreign body into the larynx except perhaps a croupy cough or hoarseness. The source of trouble (an ear-ring) in one instance was only determined and removed by the performance of tracheotomy.

Foreign bodies remaining in the larynx for a long time may set up changes and symptoms very similar to those noted in syphilis, cancer, or phthisis.

It is obvious, therefore, that foreign bodies in the larynx, if small, may produce few symptoms and little danger to the patient, while in others they may be of such a size as to produce immediate suffocation if not coughed out at once, or they may induce a lasting obstruction to breathing, during which sudden glottic spasm may at any time intervene and produce a fatal result. Such a spasm may be brought about by attempts at removal *per vias naturales*.

Treatment.—Owing to the large number of medical men who are now familiar with the use of the laryngoscope for diagnosis and treatment, cases are constantly being recorded in which foreign bodies have been removed from the larynx under the guidance of the laryngeal mirror. Consequently, recourse to bronchotomy in these cases is daily becoming less necessary. It must, however, be remembered that, so long as there is a foreign body in the larynx, the patient is never out of danger; hence, temporizing measures, which may be justifiable if the patient be under observation in a

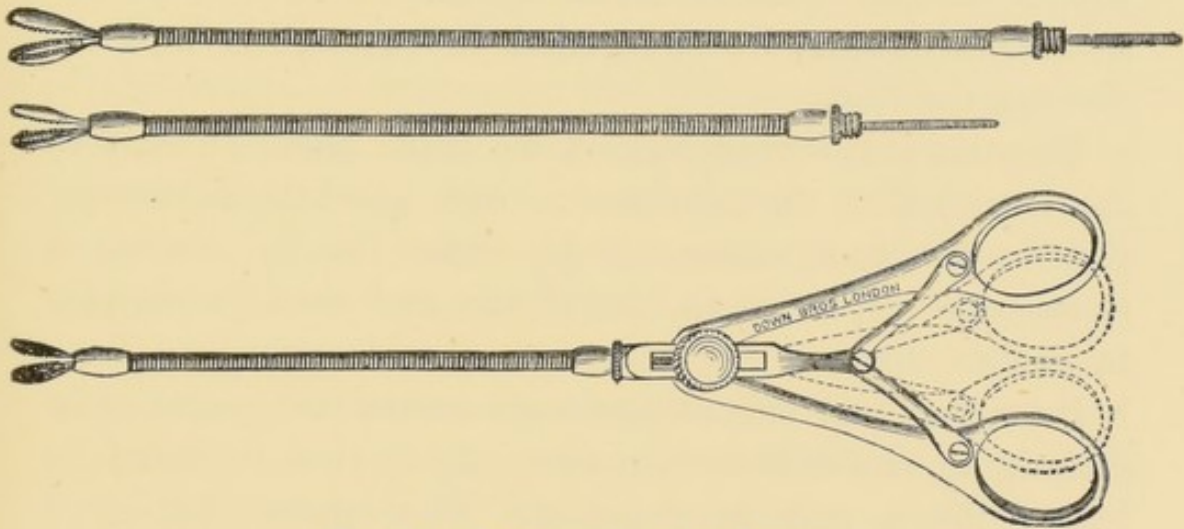


FIG. 73.—Durham's Flexible Forceps.

hospital, are wholly inadmissible if he be at a distance from medical aid. Bodies situated above the glottis can usually be removed by forceps, and the results of this method of treatment have much improved since the introduction of cocaine permitted the laryngeal mucous membrane to be anæsthetised. For the purpose of removal, laryngeal forceps, opening laterally or antero-posteriorly, according to the position of the foreign body, may be employed; or Mackenzie's tube forceps, or Durham's flexible forceps, which are capable of being curved or bent in any direction (fig. 73).

The laryngoscope has been successfully employed at very tender ages; for example, a child twenty-two months old had a splinter of bone in the larynx. This was detected by a laryngoscopic examination made while the child was half recovering from chloroform narcosis. The bone was seen to be situated between the right arytenoid and the left vocal cord. It was extracted by forceps.

Crawberry employed an ingenious method in removing a cockle-bur from the larynx. He wrapped some cotton-wool round the end of his right index finger, which he then passed down to the larynx, and, after several attempts, he succeeded in entangling and removing the bur.

Emetics and sternutatories we must mention only to condemn; they do more harm than good by favouring the deeper penetration of the object, or by causing it to become impacted in the glottis and thus giving rise to sudden death.

Inversion and succussion will sometimes succeed in dislodging the substance, especially if this be hard or heavy, like a coin or a bullet. The administration of chloroform facilitates the procedure by relaxing the spasm of the glottis which is so apt to be present. On account of the liability of the foreign body to become impacted in the glottis while inversion is being practised, this proceeding is not free from danger, and it should not be attempted unless the surgeon be prepared to do tracheotomy at once in case of need.

As far as the presence of foreign bodies in the larynx is concerned, bronchotomy should be restricted to cases in which their removal *per vias naturales* is impracticable, on account either of the urgency of the symptoms not admitting of delay, or because the patient is too young

or uncontrollable (*e.g.*, some lunatics), or because the foreign body is too firmly wedged in the larynx, or out of sight in one of the ventricles.

Surgical interference may be of three kinds: (1) Tracheotomy; (2) Thyrotomy with or without previous tracheotomy; (3) Sub-hyoidean pharyngotomy.

Tracheotomy is naturally the operation which will be undertaken in cases of great urgency, *i.e.*, where the glottis is completely occluded by a large body which cannot be removed by the forceps, and in cases of dyspnœa due to œdema or spasm of the glottis. It has happened that during the administration of chloroform, previous to the performance of tracheotomy, relaxation of the muscular spasm in the larynx has taken place, and the foreign body has been expelled either by a violent cough or by an attack of vomiting. An endeavour should be made to remove the foreign body when tracheotomy is performed, but no force must be used or permanent damage may be done to the vocal mechanism. When the patient has become accustomed to the cannula, further measures may be taken to promote the expulsion of the foreign body. Possibly the laryngoscope may now be employed and the body extracted with the forceps, or it may be dislodged by a probe introduced through the cannula or tracheotomy wound, or inversion may be tried.

If these measures fail, *thyrotomy* is usually the alternative. In some cases—as, for example, when the foreign body is out of sight in the ventricle and not giving rise to urgent symptoms—thyrotomy may be suggested as the primary operation. The weight of evidence is, however, in favour of opening the trachea before doing thyrotomy. Cases are on record in which, during the performance of thyrotomy, or during the

removal of the foreign body, severe attacks of suffocation have come on, necessitating the immediate and hasty performance of tracheotomy; hence, it is better that this operation should be done as a preliminary step to thyrotomy, when it can be performed carefully and deliberately. Moreover, as already mentioned, after tracheotomy has been performed, it may be possible to remove the foreign body without interfering with the framework of the larynx, with the consequent risk of damage to the voice. The previous performance of tracheotomy also permits of the trachea being tamponed during the thyrotomy, thereby preventing the entrance of blood into the lungs, and obviating one of the great dangers of operative procedures on the larynx. A partial division of the thyroid cartilage has been successfully performed for the removal of a foreign body. If carried out with the precaution above mentioned, the risk to life in thyrotomy is extremely small. As regards the integrity of the voice, this will greatly depend upon the time at which the operation is performed. If it be delayed, the presence of the foreign body, in contact with the delicate structures of the larynx, may set up so much ulceration as to render the patient permanently hoarse. The very greatest care should also be taken to ensure the true adjustment of the thyroid cartilages so that the vocal cords may eventually lie in their natural relationship to one another.

Holmes has discussed the whole question of thyrotomy, for the removal of foreign bodies, in an able paper in the *Medico-Chirurgical Transactions*, vol. lxxv.

Lefferts recommends *sub-hyoidean pharyngotomy* "as a substitute to thyrotomy with its possible dangers of opening so large and so important a part of the air tube,

and of permanently damaging the vocal function." He says that it is specially applicable for foreign bodies impacted in the upper portions of the larynx, and even for such as are located deep within its cavity and which, from their mode of lodgment, are not removable by the natural passage. In young children, where the symptoms of obstruction are slight, it has been found useful to administer chloroform and then examine the larynx with the index finger; if the foreign body can be felt it may be possible to remove it with suitable forceps passed in with the disengaged hand.

27. LARYNGEAL CHANGES AT PUBERTY.

At puberty, as is well known, a change takes place in the voice, more especially in the male, to which the term "breaking of the voice" has been applied. This occupies usually a few weeks or months at the outside, and though the individual may be hoarse, medical advice is not sought; occasionally, however, it happens that the process is more prolonged or incomplete, and then the patients come under observation. If, as is generally the case, hoarseness be the symptom which is complained of, it will be found that there is a certain amount of laryngeal catarrh, combined with paresis of the adductors. In one case, the catarrh may be in excess, and in another the paresis may be the more important factor. Besides these more common cases of simple hoarseness, it occasionally happens that, owing to arrested development of the vocal apparatus or to inco-ordination of the muscles of phonation, the youth speaks with a high, squeaking falsetto voice (*voix eunukoïde* of Fournier). Before proceeding to treat the patient for either of these conditions, the nose and

naso-pharynx must be carefully investigated and any abnormal condition rectified. If the voice still remains hoarse or squeaking, then Fournier's system of "laryngeal gymnastics" must be tried. "For the first three or four days, the patient is taught to make deep and slow inspirations and expirations, and, on the latter, to make a sound as low as possible. The procedure is repeated for five minutes, several times daily. Subsequently, when the patient has attained a certain routine and skill, he is made to pronounce words in the same lowest tone, making them longer and longer, and later on, to read aloud. In from ten to fourteen days, the patient is cured; that is, he becomes able to speak with his new permanent voice (usually baritone or bass) with perfect ease and freedom."

28. THE FUNCTIONS AND INNERVATION OF THE LARYNX.

The larynx has three more or less distinct functions, viz., respiratory, phonatory, and protective. Special muscles, or groups of muscles, are concerned in carrying out these functions. The abductor muscles (crico-arytenoidei postici) are the muscles which especially preside over the respiratory function, as it is by their action that the glottis remains patent. The phonatory muscles are the adductors (the crico-arytenoidei laterales, the external part of the thyro-arytenoideus and the arytenoideus), and the tensors (the thyro-arytenoideus internus and the crico-thyroideus). The third function of the larynx is the reflex action, whereby the glottis is closed to prevent the entrance of a foreign body, be it solid, liquid, or gaseous; the adductors of the cords are the muscles concerned in this case.

The action of the abductors and adductors is clearly expressed by their name; the former cause the vocal cords to separate, the latter bring them into juxtaposition. The crico-arytenodei laterales and the external portion of the thyro-arytenoideus close the anterior part of the glottis; the arytenoideus closes the posterior part. The tensors stretch the cords and render them tense; hence their name. How the thyro-arytenoideus internus acts it is difficult to say, and a satisfactory explanation is still wanting. The crico-thyroid acts by drawing up the anterior part of the cricoid. As a result of this there is a lever-like movement of the posterior part of the cricoid and the arytenoids downwards and backwards, with a consequent separation of the extremities of the vocal cords, which are thus more or less stretched. The thyro-epiglottic muscles act as depressors of the epiglottis, and the ary-epiglottic muscles assist in closing the aperture of the larynx.

This short account of the functions of the larynx will be fitly concluded by drawing attention to Semon's* excellent paper on the position of the vocal cords in quiet respiration. He has conclusively shown that the glottis is wider open during quiet respiration (inspiration and expiration) than after death, or after division of the vagi or recurrent laryngeal nerves. The average width during quiet respiration being $13\frac{1}{2}$ mm., in the cadaveric position 5 mm. This wider opening during life is brought about by a reflex tonus of the abductor muscles, due to tonic impulses, which their ganglionic centres receive from the neighbouring respiratory centre in the medulla oblongata. He further points out that the adductors ordinarily serve the function of phonation only. "Their respiratory functions are limited

* *Proceedings of the Royal Society*, vol. xlviii., p. 402.

to (a) Assistance in the protection of the lower air passages against the entrance of foreign bodies; (b) Assistance in the modified and casual forms of expiration known as cough and laughing."

Considerable difference of opinion exists as to the source of the motor nerves of the larynx. The spinal accessory has hitherto been looked upon as the motor nerve of the larynx, its fibres passing into the vagus where the nerves are in close contact at the base of the skull. On the other hand, the researches of Grossmann, Grabower, and W. G. Spencer, lend strong support to the view that the vagus (by its recurrent and superior laryngeal branches) supplies the motor innervation of the larynx.

It only remains to add that all the muscles of the larynx except the crico-thyroid, the depressors of the epiglottis (ary-epiglottic and thyro-epiglottic muscles), and possibly the arytenoideus in part, are innervated by the inferior or recurrent laryngeal nerve which is purely a motor nerve. Risien Russell has shown experimentally that "the abductor and adductor fibres in the recurrent laryngeal nerve are collected into several bundles, the one distinct from the other, and each preserving an independent course throughout the nerve trunk to its termination in the muscle or muscles which it supplies with motor innervation."

Onodi had previously obtained similar results.

The superior laryngeal nerve contains both sensory and motor fibres. It supplies sensory fibres to the mucous membrane of the larynx, and motor fibres to the crico-thyroid and the depressors of the epiglottis. As regards the arytenoid muscle, it certainly receives innervation from the recurrent laryngeal; fibres from the superior laryngeal have also been traced into the

muscle, but it is suggested that these only traverse the muscle to reach the mucous membrane covering it. Though, as above stated, the crico-thyroid is usually exclusively innervated by the superior laryngeal nerve, the recurrent laryngeal occasionally takes part in it. This is proved by the fact that cases have been observed in which, though only the recurrent laryngeal has been destroyed, nevertheless atrophy of this muscle has been present. This is one among other proofs of the statement, that conditions of innervation vary in different individuals.

The remaining point to be considered is that of the central motor innervation of the larynx. It is now known that centres for abduction and adduction exist in close proximity in the cerebral cortex. The experiments of Krause, Semon and Horsley, show that there is, in each cerebral hemisphere, an area of bilateral representation of the adductor movements of the vocal cords, situated in the foot of the ascending frontal gyrus, just behind the lower end of the præcentral sulcus. After complete excision of this area, and allowing the wound to heal, no paralysis of the cords is observed. If now the corresponding area in the opposite hemisphere be excited, a bilateral adduction of the cords is produced as completely as if the opposite area were intact.

Risien Russell has also shewn by experiment that the abductor centre is situated a little in front of, and below, the anterior extremity of the coronal sulcus, and stimulation of this area on either side produces bilateral abduction; so that here again (as in adduction) a unilateral lesion cannot produce a vocal cord paralysis. Abduction being an involuntary respiratory movement is not, like adduction, dependent on the integrity of the

cortical centre, but has a more important bulbar representation, the respiratory fibres springing from a nucleus situated in the ala cinerea in the lower half of the calamus scriptorius.

From these facts it follows that unilateral paralysis of a vocal cord from a lesion of a cerebral hemisphere is not possible. Cases in which this condition is reported to have existed have been recorded, notably by Garel and Dor; but, as Semon and Horsley point out, these cases are capable of another explanation.

Finally, in the consideration of the various forms of laryngeal paralyses, the law established by Semon must always be borne in mind, viz., "that in all progressive organic lesions of the centres and trunks of the motor laryngeal nerves, the abductors of the vocal cords succumb much earlier than the adductors." This clinical fact has been amply borne out by experimental research, which (to put it briefly) has shown:—(1) The abductors are the first laryngeal muscles to lose their excitability after death. (2) The abductor and adductor fibres preserve separate courses through the recurrent laryngeal nerve (Risien Russell). (3) That when these fibres are exposed in the living animal to the drying influence of air, the abductors lose their electric conductivity more quickly than the adductors. Should recovery from complete paralysis of abductor and adductor fibres occur, the adductors are the first to regain power. Grabower has also shown that the nerve end plates of the abductor fibres are much less complicated than those of the adductors. These and other facts go to show that there is an essential difference in the biologico-chemical composition of the laryngeal muscles and nerves, and also in the nerve nuclei from which they spring.

29. NEUROSES OF THE LARYNX.

Nervous affections of the larynx may give rise to interference with the movements of the vocal cords, due to disturbance in the functions of the motor nerves; or there may be an alteration in the sensibility of the laryngeal mucous membrane, the sensory nerves being involved in this case.

Under the heading of motor affections of the larynx will be considered paralysis, spasms, and troubles of co-ordination.

Altered conditions of the sensory nerves may lead to hyperæsthesia, anæsthesia, paræsthesia, and neuralgia.

30. POSITION OF VOCAL CORDS.

Before describing the different forms of laryngeal paralysis it is necessary to have a clear understanding as to the positions which the vocal cords may assume. These are four in number. The first is the phonatory position, or position of adduction (see Plate II.). Here the cords are in the median line and almost in contact. In quiet respiration (see Plate I.), the cords are separated by at least twice the distance which separates them after death. This is due to reflex tonus (see p. 519). In forced inspiration the cords are widely apart, in extreme abduction, and almost in contact with the lateral walls of the larynx. The remaining position, the so-called cadaveric position, is that in which the cords are found after death, or after complete paralysis of the recurrent laryngeal nerves, *i.e.*, about midway between the position of adduction and that of quiet respiration.

31. PARALYSIS OF THE LARYNGEAL MUSCLES.

Absence of, or diminution in, the functional activity of the laryngeal muscles may be of neuropathic origin, or due to changes commencing primarily in the muscles themselves.

Though for the convenience of description and reference, separate sections are devoted to bi- and unilateral abductor paralysis, it must be distinctly understood that, in the great majority of the cases, abductor paralysis is only the first stage of complete recurrent paralysis.

32. BILATERAL ABDUCTOR PARALYSIS.

Paralysis of the Crico-Arytenoidei Postici.

Ætiology.—The causes of bilateral abductor paralysis are neuropathic (central and peripheral) and myopathic. Among the neuropathic cases of central origin has been described functional paralysis, resembling the adductor paralysis so commonly met with in hysterical females, but it is very doubtful whether there is such an affection as functional abductor paralysis.

Bulbar paralysis, disseminated cerebro-spinal sclerosis, bulbar hæmorrhages, tabes, syphilitic and other diseases of the brain and its membranes are sometimes accompanied by abductor paralysis. Burger's figures show that tabes is by far the most frequent central cause.

The peripheral causes are due to pressure on both

pneumogastric, or recurrent laryngeal nerves. The usual lesions giving rise to abductor paralysis are, aneurysms of the arch of the aorta, cancer of the œsophagus, enlarged bronchial glands, enlargement of the thyroid gland of any nature, inflammatory, toxæmic, or other mischief implicating the trunks of the recurrent laryngeal nerves or their peripheral fibres. Of the myopathic causes, all that can be said is, that the crico-arytenoidei postici, from their position, are extremely liable to mechanical injury during deglutition and they are also exposed to changes of temperature; hence, it would only be reasonable to expect that primary degenerative changes should commence in the muscles, and interfere with, or abolish, their functional activity. Bilateral abductor paralysis is almost exclusively a disease of adult life, men being much more affected than women. A few cases have been recorded as occurring in children and infants, but the difficulty of making a laryngoscopic examination in children of tender years prevents one arriving at a certain diagnosis in these cases.

Morbid Anatomy and Pathology.—In considering the question of bilateral abductor paralysis, the effect of an acute complete lesion of the pneumogastric or recurrent nerves has to be distinguished from the effect of an incomplete lesion, either acute or gradually progressive. In the former case, the vocal cords fall into the position termed cadaveric; in the latter, owing to the proclivity of the abductor fibres to succumb to disease before the adductor fibres, the vocal cords will at first be imperfectly abducted, but later the paralysed cord passes into the phonatory position owing to the paralytic contracture of the unopposed adductors.

As regards the appearances found in the brain, they

are such as are usually seen in the diseases (bulbar paralysis, multiple cerebro-spinal sclerosis, tabes, &c.) which are the causes of the condition in question. In the cases of abductor paralysis due to direct pressure on the trunks of the pneumogastric or recurrent nerves, these nerves will be found flattened out, and at times so inextricably involved in the connective tissue that it is impossible to dissect them out. Microscopically, various degrees of atrophy and degeneration are found in the nerves, but a number of well preserved nerve fibres always exists. As regards the muscles themselves, they are usually found much atrophied, and represented by a few thin, pale fibres. Microscopically, the striation of the fibres is indistinct, and they are infiltrated with fatty and granular matter. Where the disease is of myopathic origin the alterations are limited to the muscles, and no changes are discoverable in the brain and nerve trunks.

Symptoms.—The symptom which first attracts the patient's attention is inspiratory dyspnœa, especially noticeable on exertion. This usually comes on gradually, and many months, even a year or two, may elapse before it attains its maximum. On the other hand, a few cases are recorded in which the onset of the dyspnœa has been acute. In severe cases, or on the supervision of a cold, suffocative attacks occur, and the patient may be more or less cyanosed. Inspiration is attended with stridor, which is more marked at night, and it is sometimes so loud as to disturb the sleep of persons in the vicinity of the patient. There is usually no difficulty in localising the seat of the obstruction, as the patient feels that the cause of his trouble is in the larynx, and in some cases he will complain of a sense of constriction in the windpipe, or of being grasped by

the throat. The voice is not markedly affected; indeed, in some cases it is almost unimpaired. Owing, however, to the dyspnœa, the patient has some difficulty in keeping up a conversation, as he is obliged to stop in order to get breath between every few words. Occasionally, hoarseness is noticeable, or the voice assumes a peculiar forced, mournful character.

On examining the patient, it will at once be seen that, while inspiration is prolonged and stridulous, expiration is comparatively easy. There is marked dilatation of the nostrils, and recession of the larynx, the supra-clavicular, and epigastric regions. The larynx

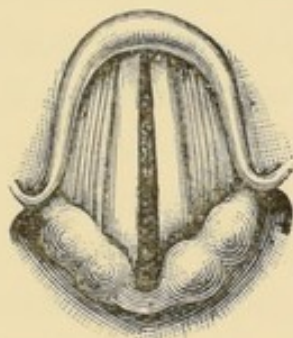


FIG. 74.—Bilateral abductor paralysis, deep inspiration.

is seen to move up and down with respiration—the so-called “respiratory excursions” of the larynx. Laryngoscopically, the cords are sometimes, but by no means always, seen to be sucked together during inspiration (fig. 74) leaving between them a chink 2 or 3 millimètres in width; during expiration the glottis is wider than during inspiration. Burow is of opinion that this is owing to the rarefaction of the air below, *i.e.*, to negative pressure. The cords are sometimes congested but they may be normal in colour.

Diagnosis.—The combination of marked inspiratory dyspnœa, with comparatively free expiration and a fairly clear voice, together with the laryngoscopic

appearances described above, is so characteristic that the diagnosis in uncomplicated cases is easy. The chief difficulty arises in distinguishing cases of bilateral ankylosis of the crico-arytenoid joint from the effects of paralysis. In ankylosis there is usually some alteration in the configuration of the arytenoids, or there may be the history or other evidence of an inflammatory affection of the larynx. But at times it will be a matter of impossibility during life to differentiate between ankylosis of the arytenoids and bilateral paralysis of the crico-arytenoidei postici.

Spasm of the adductors might, at first sight, be confounded with bilateral paralysis of the abductors, but the attack is only of very short duration, and on inquiry it will be found to have come on suddenly, and in the interval the breathing will be easy, and the vocal cords will be found to move normally. Moreover, spasm of the adductors is most frequently met with in children, whereas abductor paralysis is almost confined to adults.

Inspiratory spasm (perverted action of the vocal cords) at first sight may suggest abductor paralysis, but on getting the patient, during a laryngoscopic examination, to make the sound "e" for some seconds until sudden inspiration becomes a necessity, the cords will at last be seen to separate.

The possibility of there being a double origin to the stenosis of the larynx should be remembered. The cause of the abductor paralysis may also directly bring about stenosis of the trachea by pressure. Semon has recorded a striking example of this, in which, in addition to causing bilateral abductor paralysis by pressure on the recurrent nerves, a (?) malignant tumour of the thyroid gland had also compressed the trachea. We have also noted somewhat similar cases, the compres-

sion of the trachea in these instances being due to an aneurysm of the transverse arch of the aorta, or a malignant growth of the gullet. In these cases the amount of the dyspnœa was greater than the condition of the glottis seemed to warrant, and in the latter cases there was an absence of the respiratory excursions of the larynx, a circumstance pointing to tracheal obstruction.

Prognosis.—Eliminating the somewhat rare cases in which the disease is primarily myopathic and due to inflammatory and other changes in the muscles, and a few cases of peripheral neuritis (*e.g.*, lead poisoning), and cases due to pressure of enlarged glands, or of the thyroid gland on the recurrent nerves, bilateral abductor paralysis may be regarded as an incurable disease. A case has, however, been recorded in which, after the symptoms had existed some years, marked improvement took place. The paralysis was probably of central origin. This case would suggest that the prognosis is not absolutely unfavourable. It should ever be borne in mind that symptoms of immediate danger to life may rapidly develop, even in cases in which the disease has been stationary for months, and in patients whose breathing is comparatively easy. Tracheotomy will, in most instances, prolong the life of the patient, but as a rule he will be unable to dispense with the cannula.

The occurrence of bilateral abductor paralysis is sometimes the first intimation of the onset of tabes or bulbar paralysis.

Treatment.—Should there be any suspicion of lead poisoning, sulphate of magnesium with dilute sulphuric acid, followed by iodide of potassium in gradually increasing doses, in combination with the tincture of nuxvomica, should be given. Sajous has reported a case

of the kind in which a permanent cure was effected in about ten weeks.

If the case be of rheumatic (myopathic) origin, the patient should be kept quiet, in a warm and uniform temperature, and he should use a soothing inhalation two or three times a day (formulæ Nos. 68 or 71), and take salicylate of sodium, or iodide of potassium with alkalies.

When the paralysis depends upon disease of the nerve centres, or upon pressure on the nerve trunks, iodide of potassium in large doses should be adminis-

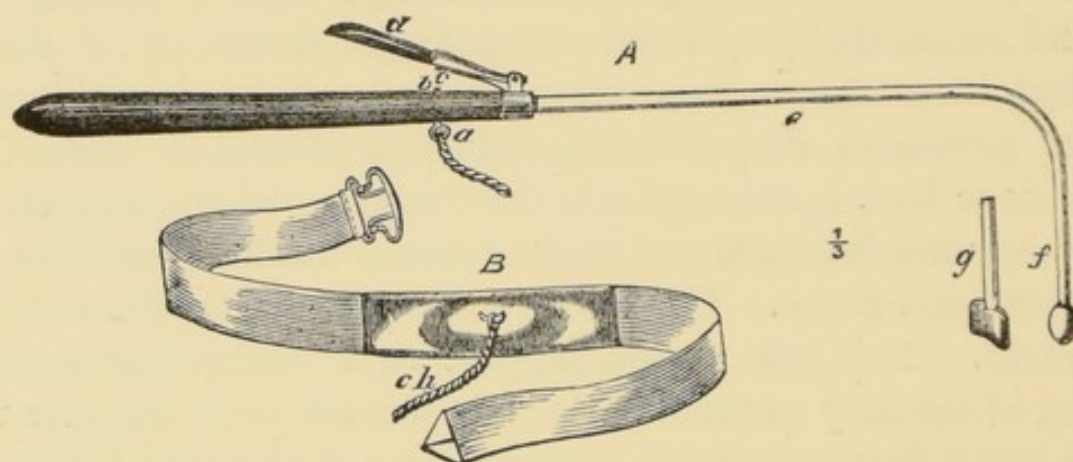


FIG. 75.—Mackenzie's Intra-laryngeal Electrode and Necklet.

tered. Inasmuch as syphilis and aneurysm are two of the commonest causes of abductor paralysis, and as both these disease are benefited by iodide of potassium, this drug is often given with advantage. Any other causal indication should be attended to; enlargement of the thyroid, for instance, may be treated with inunction of the red iodide of mercury ointment or of iodine ointment, or by operation. The direct application of galvanism to the affected muscles may be carried out by introducing Mackenzie's laryngeal electrode (fig. 75) down to the œsophagus, and then drawing it up first to one side and then to the other, so as to

bring the small spade-shaped electrode in contact with the muscles. Several applications should be made at each sitting, and repeated daily, or on alternate days, for some weeks, or even months. Subcutaneous injections of strychnine, gradually increased from $\frac{1}{30}$ to $\frac{1}{10}$ grain, in the neighbourhood of the larynx, may be made daily. The most important question to settle is the one raised by Semon: "Under what circumstances is tracheotomy to be performed in these cases, and at what period of the disease?" The general principle he has laid down is one which nearly all laryngologists will be prepared to accept, viz., "In a case of bilateral paralysis of the posterior crico-arytenoid muscles, in which a considerable stenosis of the glottis has taken place, and marked dyspnœa is present, unless *within a short time* not only *subjective* relief, but an *actual* enlargement of the glottic opening has been obtained by whatever method might be employed—then tracheotomy ought to be performed without delay, not as a means of cure, but as a prophylactic measure, with a view to the subsequent removal of the tube, in case any later therapeutic efforts should produce a real cure of the affection." Unfortunately, however, as already stated, when once tracheotomy has been performed, the cannula can very rarely be dispensed with.

33. UNILATERAL ABDUCTOR PARALYSIS.

Paralysis of the posterior crico-arytenoid muscle on one side.

Ætiology.—The most frequent cause of unilateral abductor paralysis is pressure upon one pneumogastric

or recurrent laryngeal nerve—as, for example, by cancer of the œsophagus, aneurysm of the aorta, goitre, syphilitic gumma. The right recurrent nerve is sometime compressed by an aneurysm of the sub-clavian, or innominate arteries, or involved in a pleural thickening at the apex of the lung. Bulbar lesions, as in tabes, neuritis of the recurrent nerve, after influenza, diphtheria, pneumonia, enteric, lead, arsenic, &c., or a primary myopathic change, are the other causes of the paralysis.

The **pathology** of the disease has already been described in treating of bilateral abductor paralysis.

The **symptoms** of unilateral abductor paralysis are often so slight that, without a laryngoscopic examination, it may be impossible to diagnose the condition. Very frequently there are no laryngeal symptoms whatever, and the paralysis is only detected by a chance examination. The voice is usually normal, but it may be to a certain extent hoarse, rough, or feeble. The breathing is not interfered with, though there may be slight dyspnœa on exertion, due to the fundamental mischief. Laryngoscopically, the affected vocal cord will be seen immobile in the median line. This condition may be preceded by a stage of which the only sign is a defect in the outward movement of the cord. After the lapse of some time, the adductors may become paralysed also, and then the cord assumes the place it occupies in complete paralysis of the recurrent nerve, the so-called cadaveric position. This is followed by further deterioration of the voice. If the lesion be above the point at which the superior laryngeal nerves are given off, the paralysis will be associated with anæsthesia of the laryngeal mucous membrane.

Diagnosis.—Unilateral abductor paralysis has to be

distinguished from complete paralysis of the recurrent nerve, and from fixation of the cord as a result of disease of the crico-arytenoid joint. The points of differentiation from the latter condition are discussed under the head of "Bilateral Paralysis."

Prognosis.—In some cases, where enlarged glands or a syphilitic growth has caused the paralysis, the absorption of the tumour pressing on the nerve has resulted in restoration of function. It is to be remembered that not only are the abductor fibres more prone to succumb to organic disease than the adductor fibres, but they are also less capable of recovering from it. In cases in which the disease is due to a neuritis, or is of myopathic origin, a more or less complete cure may be expected. If the abductor paralysis has been followed by adductor paralysis, the vocal cord becoming fixed in the cadaveric position, and if this condition has existed for any considerable time, there is not much hope of improvement.

Unilateral abductor paralysis, in itself, does not endanger life; the gravity of the condition depends upon the fact that it is so frequently due to some grave organic disease, hence the recognition of its existence should lead to a careful examination of the patient in order to discover the cause of the paralysis. The possibility of unilateral abductor paralysis being followed by bilateral affection of the abductor muscles has to be taken into consideration. Cases of the kind have been recorded.

The **treatment** is the same as that for bilateral paralysis, except that tracheotomy is not required.

34. COMPLETE PARALYSIS OF THE RECURRENT LARYNGEAL NERVES.

In this affection there is loss of function in all the intrinsic laryngeal muscles—the adductors as well as the abductors—and the vocal cords are found in the cadaveric position. One or both nerves may be paralysed. The term “laryngoplegia” has been applied to this condition. Schmidt has collected 150 cases. Of these, 92 occurred on the left side, 46 on the right, and in 12 cases both nerves were involved; 106 men and 44 women were affected.

Unilateral recurrent paralysis is, in the majority of cases, due to compression of the recurrent or vagus. On the left side, the recurrent is particularly liable to be pressed upon by an aneurysm of the arch of the aorta; hence the discovery that the left vocal cord is in the cadaveric position should at once excite the suspicion of the presence of an intra-thoracic aneurysm. On the right side, the recurrent may become implicated in the pleural thickening accompanying tuberculosis of the apex of the lung. The recurrent nerve may also be compressed by a goitre, cancer of the œsophagus, tumours of the mediastinum, or enlargement of lymphatic glands. The motor nerves to the larynx may be involved in syphilitic mischief at any part of their course from their origin to their distribution. Bilateral complete paralysis is rare; it may be due to simultaneous pressure on both recurrences (tumour of thyroid, œsophageal cancer, several aneurysms at the base of the neck, a single large aortic aneurysm, or multiple glandular enlargement). A case of bilateral paralysis due to the pressure of a pericardial effusion on both

nerves has been observed. Johnson and Baeumler have recorded cases in which pressure on one vagus has caused bilateral recurrent paralysis; the former writer has put forward the view that in these cases organic changes in the nerve centres are set up by the pressure on the pneumogastric, so that the double paralysis results from a central lesion.

Paralysis may also be due to peripheral neuritis resulting from cold, from diphtheria, and other toxæmic conditions. Finally, bulbar lesions may give rise to recurrent paralysis, and in some cases the lesion is due to tabes.

If in a case of complete recurrent paralysis, pressure on the nerves can be excluded, and if there exist conjointly with the laryngeal symptoms, other paralytic manifestations in the domain of the hypo-glossal or of the facial, one is led to the diagnosis of a bulbar or peribulbar lesion (for example, peribulbar syphilitic pachymeningitis). Where the laryngeal paralysis exists with simultaneous paralysis of the palatal and pharyngeal muscles, sterno-mastoid and trapezius of the same side, it is quite possible that both the vagus and the spinal accessory nerve are involved in a similar lesion, *e.g.*, basal pachymeningitis or a multiple nuclear lesion. Such a combination does not in our opinion go to show that the spinal accessory supplies the motor innervation of the larynx. The co-existence of abductor paralysis on one side, and cadaveric position on the other, signifies a lesion of the two recurrences, or of the two vagi, or of their nuclei of origin, with more complete paralysis on one side than the other.

Symptoms.—In complete bilateral paralysis of the recurrent nerves, there is a certain amount of dyspnœa on exertion (but not approaching in severity to that met

with in paralysis of the abductors), the voice is extinct and there is "phonatory waste of air" (v. Ziemssen). On laryngoscopic examination, both cords will be found immobile in the cadaveric position.

In complete unilateral paralysis of the recurrent nerve, dyspnoea is not noticeable, and the voice varies

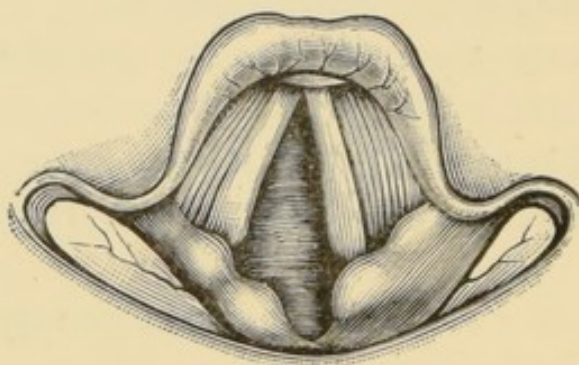


FIG. 76.—Complete paralysis of left recurrent. Inspiration.

very much in accordance with the compensatory action of the healthy vocal cord. On laryngoscopic examination, the vocal cord will be found nearer the middle line (cadaveric position), than in normal quiet respiration; the free border of the cord is concave from want of

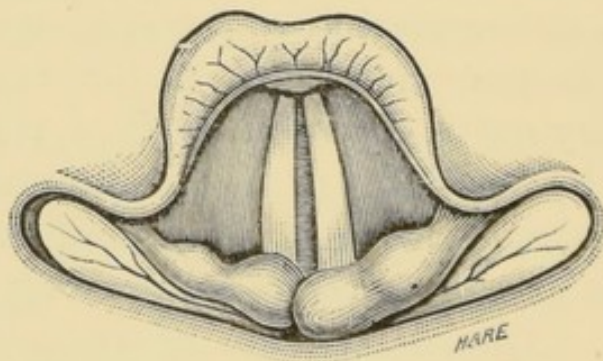


FIG. 77.—Complete paralysis of left recurrent. Phonation.

tension, and there is asymmetry of the two sides of the larynx (fig. 77). On phonation the unaffected cord comes to the position of phonatory adduction, and sometimes even transgresses the median line so as to come in contact with its inert fellow, the arytenoid cartilage of the sound side passing in front of the other (fig. 77).

Diagnosis.—Complete paralysis of the recurrent nerve has to be distinguished from abductor paralysis. In the latter, the vocal cord is in the phonatory position (middle line), whereas, in complete paralysis, the vocal cord is in the cadaveric position. For the rest, what has been said of the diagnosis, prognosis, and treatment of abductor paralysis (see pp. 528-531) applies equally well to complete recurrent paralysis.

35. BILATERAL ADDUCTOR PARALYSIS.

Bilateral paralysis of the crico-arytenoidei laterales and the arytenoideus; the thyro-arytenoideus is also involved.

Ætiology.—Anæmia, neurasthenia and hysteria, are the chief predisposing causes of bilateral adductor paralysis. Irregularity in menstruation, and pregnancy also predispose to it. It usually occurs in women, but men may be affected, and it is not altogether unknown in children. The exciting causes are traumatism, such as removal of a tooth, emotion, especially fright, the onset of some acute diseases, such as laryngitis, tonsillitis, pneumonia, and exposure to cold. It may be the first evidence of hysteria, or may follow other hysterical manifestations. It occasionally occurs as a precursor of phthisis.

Morbid Anatomy and Pathology.—As this is essentially a functional disease, and does not lead to a fatal termination, no lesions have been described either in the nervous or muscular apparatus of the larynx; it is probably due to derangement of the cortical centres for adduction. In most cases, one has to do with paresis rather than complete paralysis.

Symptoms.—*The* symptom of bilateral adductor paralysis is aphonia; it usually comes on suddenly, and disappears as suddenly. The patient may, however, cough, laugh, and sneeze quite naturally, and, if frightened, may cry out or scream involuntarily. When phonation is attempted during a laryngoscopic examination, it will be seen that, in some cases, the cords fail to approach the middle line; in others, the cords come nearly up to the middle line, leaving an opening two or three millimètres wide; and again, in others, though the cords actually meet in the middle line, nevertheless no sound is heard. The ventricular bands sometimes approach one another in a compensatory manner, so as to conceal the vocal cords. Hysterical aphonia has been observed in combination with spastic dyspnœa. Very frequently, a diminution or loss of sensibility in the mucous membrane of the larynx and pharynx co-exists with the loss of movement in the former.

Diagnosis.—The presence of aphonia and the laryngoscopic appearances suffice for the establishment of the diagnosis. When a young female has no difficulty in coughing, but is unable to phonate, functional aphonia should be suspected. The existence of conditions interfering mechanically with the approximation of the cords, will render the diagnosis of functional aphonia untenable. If diphtheria can be excluded, hysteria should be suspected. The possibility, especially in military service, of the aphonia being simulated, should always be borne in mind. A sharp application of the faradic current to the vocal cords will often complete the diagnosis and cure at the same time.

Prognosis.—This affection is not attended with any risk to life, and almost invariably terminates with complete restoration of the voice. One of us (F. de H. H.)

had, however, a patient under his care who resisted the most persevering and energetic treatment, although the vocal mechanism was proved to be perfect by the fact that, on faradising the patient while she was under the influence of ether, she called out loudly, but immediately lost her voice on regaining consciousness.

Treatment.—The first thing to be done is to attend to the general health of the patient. If anæmia be present, iron should be administered in full doses. The addition of strychnine will improve muscular tone, and it will be found the most efficacious remedy in these cases. It should be given in doses commencing with $\frac{1}{30}$ grain, and gradually increased up to $\frac{1}{10}$ grain, three times a day, until physiological effects are produced. When the patient is in good general condition, then, and not till then, the vocal cords should be faradised by means of Morell Mackenzie's electrode (see fig. 75, p. 530), or, if this be not available, by passing the current through the larynx externally. The current which is employed at the first sitting should be sufficiently strong to give a very decided shock, otherwise faradisation may fail entirely. It is well to impress the patient that immediately the shock is felt the voice will return. A friend of the patient should be present. Should faradisation fail, galvanism may be tried, or the static current as recommended by Fletcher Ingals. In fact it is highly probable that any novel device capable of producing a sudden shock or impression on the patient will succeed, if the latter has no doubt as to the physician's confidence in the remedy. Massage of the larynx externally has given good results in functional aphonia. Stimulating sprays, such as formulæ Nos. 61, 62, and 63, may also be employed with advantage.

Any local condition of the upper respiratory passages requiring treatment should be attended to. There are cases on record in which the cauterisation of hypertrophic rhinitis, the removal of hypertrophied turbinals and other nasal obstructions have been followed by cure of the aphonia. Hypnotism has been successful in curing functional aphonia. This is just the class of case in which one might reasonably expect to get good results from hypnotism, but it is hardly to be recommended unless all ordinary means fail, and then only when the influence is brought to bear by qualified experimenters.

36. UNILATERAL ADDUCTOR PARALYSIS.

Paralysis of the adductor muscles on one side of the larynx has been described; but its existence, apart from other than local causes is highly problematical, and the cases which have been reported are capable of being explained in other ways. The most probable explanation is, that in the cases in question there was complete unilateral paralysis of the recurrent nerve, the vocal cord being in the cadaveric position, and not abducted.

37. PARALYSIS OF THE ARYTE-NOIDEUS.

This little muscle, from its exposed situation, is extremely liable to injurious influences. It is readily involved in inflammatory mischief of the mucous membrane covering it; tuberculosis of the larynx seems

especially prone to affect it, and it oftens succumbs in hysteria. In the two former cases, the cause of the paralysis is a myopathic process. It is frequently paralysed in combination with the other adductor muscles of the cords.

In uncomplicated cases of paralysis of the arytenoideus, the cords approximate in the anterior two-thirds, but leave a gap at the posterior third (fig. 78). When, as sometimes happens, the internal tensors are also



FIG. 78.—Paralysis of arytenoid muscle.



FIG. 79.—Paralysis of internal thyro-arytenoidei and arytenoideus.

paralysed the appearance represented in fig. 79 is produced.

The treatment is the same as that for the other forms of adductor paralysis, but the affection is sometimes very obstinate.

38. PARALYSIS OF THE INTERNAL TENSORS OF THE VOCAL CORDS.

Paralysis of the Thyro-arytenoid Muscles.

Ætiology.—Over-use of the voice, laryngeal catarrh, anæmia, and hysteria, are the chief causes of this condition. Mackenzie thinks it is probable that an actual sprain of the muscle from undue effort in vocalisation may be a cause. Some loss of power in the thyro

arytenoid muscles is frequently met with accompanying other forms of laryngeal paralysis, arising from central nerve lesions and in commencing paralysis of the adductors, the internal tensors are often the first to go.

Symptoms.—Feebleness of the voice, or hoarseness, is the usual symptom. The cords are generally congested and relaxed; on attempted phonation, an elliptical opening is left between them (fig. 80). Occasionally, only one cord is affected; on attempted phona-

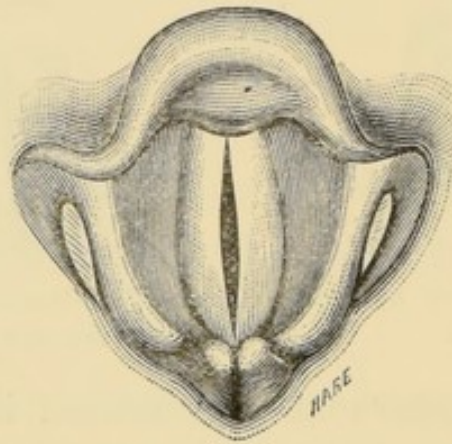


FIG. 80.—Paralysis of the thyro-arytenoideus.

tion the healthy cord will be straight in the median line, whereas the free margin of the affected cord will present a concave appearance.

Treatment.—If due to over-use or straining of the voice, complete rest, with sedative inhalations, and internal administration of strychnine in full doses, should be ordered. If the voice remains feeble, galvanism, or faradisation should be employed endo-laryngeally, the latter form of electricity being especially useful in hysterical cases.

39. PARALYSIS OF THE EXTERNAL TENSORS OF THE VOCAL CORDS.

Paralysis of the Crico-thyroid Muscles.

Ætiology.—In paralysis of these muscles the superior laryngeal nerve is affected. Diphtheria is the most frequent cause. A cold blast of air, pressure of enlarged glands on, or direct injury to, the nerves have also been noted as causes. The disease may be uni-lateral or bilateral, but both forms are uncommon.

Symptoms.—According to Gottstein, paralysis of the external tensors gives rise to a rough, deep voice, which the patient is unable to modulate in the production of high notes. On laryngoscopic examination in bilateral cases, the glottis has a wavy line; in unilateral cases, the affected cord will be seen to be less tense than its fellow, and lying at a somewhat lower level. In Heymann's cases, concavity of the free border of the vocal cords was the only objective evidence of their loss of tension.

Owing to the superior laryngeal nerve being the sensory nerve to the mucous membrane of the larynx, there will also be anæsthesia of the parts supplied by it.

Prognosis.—The danger in these cases depends upon the associated anæsthesia, whereby food and foreign bodies may enter the larynx and set up pneumonia. The possibility of cure will of course depend upon the nature of the lesion.

Treatment.—In diphtheritic cases, the paralytic condition of the muscles is best treated by stimulating liniments or by blistering over them, and by the use of faradisation or galvanisation, in which, it has been

recommended that one pole is to be placed in the pyriform sinus. Strychnine should also be given internally or by hypodermic injection. Mercury or iodide of potassium will be given if the cause of the paralysis can be traced to a syphilitic lesion such as basal pachymeningitis. The danger of food entering the larynx may be prevented by feeding the patient through an œsophageal tube, with a funnel attached to the upper part. Before injecting the nutritive fluid, however, the patient should be directed to phonate lest the tube should have entered the insensitive larynx instead of the œsophagus.

40. SUMMARY OF SYMPTOMS AND LARYNGOSCOPIC APPEARANCES MET WITH IN PARALYSIS OF THE NERVE TRUNKS INNERVATING THE LARYNX.*

Lesion of Pneumogastric above the Origin of the Recurrent.

In this case, in addition to the paralytic phenomena due to the implication of the recurrent fibres, there may be signs of laryngeal irritation, *i.e.*, cough and spasm.

Complete Paralysis of Vagus.

In a case of right sided paralysis observed by Moeser the right vocal cord was in the cadaveric position; during quiet respiration, the right border of the epiglottis was at a higher level than the left, due to para-

* For these remarks (excepting that under "Spinal Accessory") we are largely indebted to Luc's excellent treatise "Les Névropathies Laryngées," 1892.

lysis of the muscular fibres depressing the epiglottis and innervated by the superior laryngeal; during phonation, the healthy cord was more stretched than its fellow, due to paralysis of the crico-thyroid, and the processus vocalis of the healthy side not only passed behind the corresponding part of the opposite cord, but was at a lower level. In addition to paralytic phenomena, lesion of the vagus is accompanied by loss of sensation in the laryngeal mucous membrane.

Lesion of Spinal Accessory.

Paralysis of the sterno-mastoid and trapezius, and of the levator palati and superior constrictor of the pharynx on one side. If the lesion producing this condition occurs where the spinal accessory and vagus are in close contact it is possible that these paralyses may be associated with immobility of the vocal cord on the same side, and if the hypo-glossal be also affected the tongue would be protruded towards the weakened side.

Before leaving this subject we insert in tabulated form, the conditions which may give rise to laryngeal paralysis, for the use of which we are indebted to its compiler, Sir Felix Semon.

I.—Bulbar and Bulbo-spinal Affections.

- (1) Hæmorrhage and softening.
- (2) Syphilitic processes.
- (3) Tumours.
- (4) Diphtheria.

II.—Peripheral Affections.

- (1) Acute rheumatic influences.
- (2) Catarrhal neuritis.
- (3) Toxic influences (lead, arsenic, &c.).
- (4) Tumours in the posterior cavity of the skull, or in the foramen lacerum or foramen jugulare.

I.—Bulbar and Bulbo-spinal Affections.

(5) Progressive bulbar paralysis.

(6) That curious form of systemic central nervous disease, first described by Hughlings Jackson and Morell Mackenzie, in which one-half of the tongue, the corresponding half of the palate, the corresponding vocal cord, and, in a number of cases, the corresponding trapezius and sterno-mastoid muscles are affected.

(7) Amyotrophic lateral sclerosis.

(8) Disseminated cerebro-spinal sclerosis.

(9) Siringomyelia.

(10) Tabes dorsalis.

II.—Peripheral Affections.

(5) Pachymeningitis.

(6) Traumatism (unintentional ligature of nerves, injection of iodine into a goitre, cut throat, stabbing, injury during extirpation of goitre, &c.).

(7) Tumours of neck (goitre, peritracheal glands, &c.).

(8) Aneurysms of the arch of the aorta, innominate, subclavian, carotid.

(9) Mediastinal tumours (malignant, tuberculous, calcification of bronchial glands, &c.).

(10) Pericarditis.

(11) Pleurisy.

(12) Tuberculosis and pleuritic thickening of apex of right lung.

(13) Chronic pulmonary affections (chronic pneumonia, anthracosis, &c.).

(14) Infectious fevers (typhoid, &c.).

(15) Œsophageal carcinoma.

41. LARYNGEAL SPASM.

Spasm, or excessive action, may affect all the muscles of the larynx, or it may be confined to one or more muscles.

Of the first variety there is no distinct clinical evidence, though it is theoretically conceivable. Turning our attention to the three groups of muscles, viz., abductors, adductors, and tensors, there may be spasm of either of them. Spasm of the abductors has been met with in hydrophobia. Spasm of the adductors is of frequent occurrence, and is at times fatal. Spasm of the tensors sometimes occurs in connection with spasm of the adductors, producing the condition known as aphonia spastica.

42. SPASM OF THE ADDUCTORS OF THE VOCAL CORDS.

Laryngismus stridulus.

Spasmodic contraction of the crico-arytenoidei laterales, external thyro-arytenoidei and the arytenoideus, whereby the cords are approximated and the glottis closed, commonly called spasm of the glottis or laryngismus stridulus.

Ætiology.—Spasm of the adductors may occur in children or adults. Among the former it is usually met with between the ages of six months and three years; males are attacked in greater number than females. Gee has pointed out that the attacks are more frequent at the end of winter and beginning of spring, and explains the greater liability to the disease at this period of the year, as being due to the state of nervous erethism produced by the children having been kept indoors, during the winter, in warm and badly ventilated rooms. Almost all the children who suffer from laryngismus are at the same time rickety; the exact connection between the two diseases is not quite clear.

A neurotic inheritance is also frequently met with. Diseased conditions of the nose, naso-pharynx, pharynx, and larynx, at times give rise to spasm of the glottis. Nasal polypi, hypertrophic rhinitis, and deflections of the septum, have all been known to do so. Attention has been drawn to the connection between adenoid vegetations and laryngismus, and Mantle has pointed out that elongation of the uvula may produce symptoms resembling laryngismus. Teething is a frequent cause.

It must not be forgotten that spasm of the glottis may be due to a nervous lesion, which has been overlooked. Betz has recorded the case of a child a year old, who died from glottic spasm; at the necropsy a partial luxation of the occipito-atloid joint, and consequent pressure on the medulla oblongata, was discovered.

In adults, laryngismus is mostly confined to hysterical females, but cases have been recorded as occurring in males. One of us (H. T.) has seen a well-marked case in an apparently healthy man. The patient had an extremely irritable pharyngeal and laryngeal mucous membrane, the result of excessive cigar smoking. On one occasion the mere depression of the tongue induced a severe spasm, during which the patient fell off his chair on to the floor, became deeply cyanosed, and then after a long drawn inspiratory stridor quickly recovered himself.

In tabes, attacks of spasm of the adductors occur, constituting the so-called laryngeal crises; in many of these cases the affection is complicated with paresis of the abductors.

Morbid Anatomy and Pathology.—The disease, being essentially of functional origin, presents no post-mortem appearances to indicate its nature. Elsaesser

attempted to explain the connection between rickets and laryngismus, by attributing the symptoms to pressure on the brain, owing to the softness of the occipital bone, when the child is in the recumbent position. The most probable explanation of the relationship between these two diseases is to regard them both as the outcome of defective nutrition, producing in the one case laryngismus with hyper-excitability of the nerve centres, and in the other rickets with its osseous and other changes. According to Semon and Horsley, laryngismus may be a respiratory convulsion, the nervous discharge starting from that portion of the centre which presides over the adductors of the cords. Though the unstable condition of equilibrium of the nerve centres is the prime cause of the spasm, the immediate exciting cause is often some reflex irritation, such as occurs from the stomach containing too much or improper food, dentition, the presence of worms, and exposure to draughts. Nasal catarrh, adenoids, and enlarged tonsils, by occluding the nostrils and producing mouth breathing, with all its drying and irritating effect on the laryngeal mucous membrane, are not uncommon causes.

Symptoms.—The mode of onset varies. In children who are predisposed to laryngismus, an attack may be brought about by crying, a fit of passion, or any reflex excitement, as above mentioned. If the attack occurs at night, as is usually the case, the child wakes up with difficulty in breathing; inspirations are at first short, then slightly prolonged, and are attended with a crowing sound, the child appears frightened, and sometimes catches hold of its throat. In cases of greater severity the breathing stops; the face, which is at first pale, soon becomes cyanosed. The accessory muscles of

respiration act vigorously, but no air enters the chest. The spasm may last from 15 to 90 seconds, or in rare cases may not relax before the patient dies asphyxiated. In general, however, after a few seconds, a long, whistling inspiration is heard, and the breathing gradually resumes its normal character. Severe cases are usually accompanied by carpo-pedal contractions (*i.e.*, spasmodic flexion of the thumb on the palm, and the hand on the wrist, the feet bent on the legs and the great toe abducted). In cases of still greater severity general convulsions occur, and may be accompanied by evacuation of urine and fæces; or, to quote Cheadle, "Laryngismus, tetany, and general convulsions are the positive, comparative, and superlative of the convulsive state in children." This sequence of events is easily explained on the supposition of an overflow of nervous energy from the laryngeal centre to the adjacent cortical centres for the limbs. In other cases the spasm occurs in the daytime, and is only noticed when the child cries violently or gets excited. It is exceptional for only one attack to occur; they generally recur more or less frequently, increasing or decreasing in severity. After the attack is over the little patient seems quite well again and appears as if nothing had happened. A tendency to laryngeal spasm in children is not uncommon after whooping cough.

Spasm of the glottis in adults presents much the same set of symptoms as in the case of children, and may be due to irritation of the nerve trunks supplying the laryngeal muscles, to irritable conditions of the laryngeal and pharyngeal mucous membranes, elongated uvula, and to lesions of the nerve centres as in the laryngeal crises of tabes, tetany, and hysteria.

Diagnosis.—Laryngismus stridulus has to be dis-

tinguished from catarrhal laryngitis. In the latter there is fever, hoarse voice and cough; and dyspnoea, if present, is more constant. In the adult, spasm of the adductors might be confounded with paralysis of the abductors; the differential diagnosis is given at page 528.

Prognosis.—The danger to life is greater in proportion to the youth and feebleness of the patient. If all the muscles closing the glottis participate in the spasm, the attack will be shorter and less dangerous than when there is only partial closure of the glottis. In the former case, carbonic acid poisoning annihilates the excitability of the motor nerves of the adductors of the larynx before the respiratory centre is affected; whilst, in cases of incomplete closure of the glottis, there is still sufficient oxygen introduced to keep up the nervous supply to the adductors, so that the spasm continues. Cases which do not exhibit stridor are more serious than others.

In the adult the prognosis is almost invariably good; nevertheless I (F. de H. H.) am acquainted with one case in which tracheotomy had to be performed to avert threatened death from suffocation.

Treatment.—At the time of the attack the child should be placed in a hot bath, and cold water may be sprinkled over the chest, or the back flapped with a wet towel. In some cases, a spank on the gluteal region will start off respiration. If the spasm does not yield to these simple measures, a whiff of chloroform will usually produce relaxation; if not, intubation or tracheotomy may be necessary. In the intervals, the general condition of the child and its hygienic surroundings should be attended to. Especial attention should be paid to the diet of the child; fresh air and

cold sponging are of the utmost importance. In some cases, lancing the gums gives relief. Cod-liver oil and the syrup of the iodide of iron are the drugs on which most reliance may be placed. Bromide of potassium should be given for some time in order to diminish the tendency to spasm.

The treatment in the adult should be directed towards removing the cause of the reflex excitability. In the case already referred to, abstinence from tobacco at once cured the spasm, it recurred two months later when a cigar was again smoked for the first time. Any abnormal condition of the nose, throat, or other organ should receive appropriate treatment, for as long as the reflex irritation exists, so long will the tendency to spasm persist. In the laryngeal crises of tabes the inhalation of amyl nitrite is said to give relief, and if the condition is due to hyper-excitability of the adductor centres, then all things calculated to irritate the larynx should be avoided, *e.g.*, alcohol, tobacco, hot condiments, &c. Bromide of potassium is especially useful in quieting the nervous system, and anti-spasmodics may also be given (formula No. 46).

Faradisation is sometimes effectual in stopping the spasm. In a severe case of hysterical spasm of the glottis occurring in a young woman, the spasm, which had been urgent for five hours, ceased five minutes after the application of galvanism over the larynx, and in the course of the pneumogastric nerves; twenty cells were used at first, and afterwards thirty.

43. INFANTILE RESPIRATORY SPASM.

Congenital Laryngeal Stridor.

In connection with laryngismus stridulus must be mentioned a curious kind of breathing met with at birth, or coming on a few weeks afterwards.

Gee calls this condition "respiratory croaking in babies." He describes the breathing as being accompanied by a croaking noise, having more of the character of stertor than of stridor.

John Thomson points out that, during the presence of the stridor, "inspiration begins with a croaking noise and ends in a high-pitched crow, which two of the mothers correctly described as 'very like a hen.' When the breathing is quiet, the crow does not occur, and only the croaking is heard. Expiration is accompanied by a short croak when the stridor is loud, but at other times it is noiseless." The above description exactly corresponds with cases under our care, in which the crowing noise was very marked.

The stridor usually increases in loudness for two or three months, and then gradually passes off. Gee knows of no case in which it lasted beyond the end of the first year. In some cases no defect in the general health can be detected, the patients being well nourished and in the best of health; but sometimes the infants are sickly, the digestion being particularly affected.

The child seems but little, if at all, distressed by the disorder; as a general rule there is no dyspnoea and no cyanosis, although the latter symptom has been reported in a case which proved fatal. Thoracic and

abdominal retraction is generally present, but varies from time to time in the same patient. In many instances of the disease which have been described neither enlarged tonsils nor adenoid growths were present. The stridor is increased by anything which excites the child; during sleep the stridor is sometimes absent and sometimes present, the difference possibly depending upon the soundness of the sleep. The voice remains unaffected.

The pathology of the affection has recently been carefully investigated by Lack and Sutherland (London), and by John Thomson and Logan Turner (Edinburgh). The former look upon the condition as due to a congenital deformity of the superior laryngeal aperture aided by the flaccidity of the parts in infancy.

The deformity consists of a folding backwards of the epiglottis upon itself, so that the upper aperture of the larynx is reduced to a slit by the approximation of the ary-epiglottic folds.

The last mentioned observers, by observation and carefully conducted experiments, conclude "that the primary element in the causation of this condition is a disturbance of the respiratory movements, probably due to some developmental backwardness of the cortical structure which controls them." They agree that the affection depends upon the valvular action of the upper aperture of the larynx described by Lack and Sutherland, but look upon it (1) as merely an exaggeration of the normal infantile type and mainly produced by the ill co-ordinated and spasmodic nature of the breathing; (2) "that the supposition of a congenital conformity is not essential to account for the symptoms, inasmuch as normal babies crow in a very similar manner when they are coming out of chloroform."

Avellis (Frankfort) maintains that the stridor is the result of pressure of an enlarged thymus upon the trachea, but in the latter case the stridor is mainly expiratory and is devoid of "croaking," there is considerable distress, and there are no up-and-down laryngeal movements as in the true infantile laryngeal stridor, where the obstruction is above the glottis.

Diagnosis.—The main features to be borne in mind are:—The peculiar characters of the stridor which occurs day and night, the evidence of obstructed respiration without, as a rule, any apparent distress, and the loud, clear cry. Infantile respiratory spasm is to be distinguished from laryngismus stridulus by the following circumstances:—The former is met with at birth, or comes on a few weeks later, and there is no special condition of ill-health found in connection with it; laryngismus is pre-eminently a disease of the period of first dentition and of rickety children. As already mentioned, infantile spasm is of much shorter duration than the attack of laryngismus; but, on the other hand, it is much more constant, the spasm accompanying most of the inspiratory acts for months. In laryngismus the attacks are comparatively infrequent, occur at long intervals, but are usually very severe, causing urgent dyspnoea and cyanosis. Crying and swallowing often start off an attack of laryngismus, but infantile spasm is diminished or even checked by crying, and is not affected by deglutition. Laryngismus frequently comes on just as the child awakes from sleep; this is not the case with infantile spasm.

Prognosis.—This is generally good, but as already stated, fatal cases, or cases requiring tracheotomy, have been met with. The amount of inspiratory recession gives a good idea of the amount of narrowing of the air

passage which is present. Other things being equal, the older the patient the better the prognosis.

Treatment.—No special treatment is of any use. Attention to the general health, with regulation of the diet and hygienic surroundings of the patient, are all that require to be done in the simpler cases. If the inspiratory recession is great, and if marked cyanosis supervenes, tracheotomy may be necessary.

44. NERVOUS LARYNGEAL COUGH.

Closely allied to spasm of the adductors is a condition to which the term "nervous laryngeal cough" has been applied.

In these cases separate spasmodic contractions of the adductors, quickly following one another, are accompanied by similar contractions of the expiratory muscles giving rise to a cough often resembling the bark of a dog. This curious condition is generally met with in girls between the ages of sixteen and twenty; it may, however, occur in boys, and it has been noticed in young children. Sir Andrew Clark described a similar affection under the name of "the barking cough of puberty." It usually occurs in patients who are themselves neurotic, or have a neurotic inheritance. Gowers regards some of these cases occurring in boys as belonging to the affection known as "habit chorea" or "habit spasm," and the cough may alternate with spasmodic movement in some other part of the body. In another class of cases, also in boys, he has found it always associated with the habit of masturbation, and that treatment had little or no effect until this habit

was stopped, and then the patients got rapidly well whatever treatment was employed.

No local lesions in pharynx, larynx, or chest are found associated with "nervous laryngeal cough." According to Clark, over-feeding occurred in all his cases.

Schroetter has described a series of eleven cases under the head of laryngeal chorea. From his description, they probably belong to the class of cases we are now considering.

In some cases there is a single dry, hard cough coming on every few minutes, or the affection may manifest itself in paroxysms, consisting of a close succession of loud, dry, clanging, convulsive coughs, varying in intensity and duration. The cough may last for months, or even years, and apparently have but little effect upon the health of the patient, but constituting an intolerable annoyance to those in his vicinity. A lady, twenty-eight years of age, who had suffered from a cough of this nature for about two years, while on a voyage to Australia in the hope of curing it, had so severe an attack of spasm of the glottis that tracheotomy became necessary, but she lost her cough. Mackenzie records a similar case. These cases show that though the disease is usually more troublesome than serious, there is, nevertheless, an element of danger in it.

Treatment.—As in all neurotic affections the patient's mode of life should be suitably regulated; early hours, regular exercise, and plain, wholesome food advised. Medicinally, nervine tonics and sedatives, such as formulæ Nos. 24 and 46, may be tried. The application of a cantharides plaster to the spine over the fourth and fifth dorsal vertebræ is beneficial in some cases. Locally, brushing the interior of the throat with a 10 per cent. solution of cocaine has been suggested, but

we have not found much benefit from this method of treatment. If all other plans fail, the question of a short sea voyage should be raised. Semon states that in six out of the seven cases in which he ordered a sea voyage, the cough, which had previously resisted all kinds of treatment, disappeared within a short time—three weeks at the utmost—after the commencement of the voyage, and did not return. In an inveterate case of the kind, in a lady aged 31, seen by one of us (H. T.) which was cured by a voyage only to return on landing, the impression produced upon the patient by a very strong intra-laryngeal faradic shock, coupled with the assurance of its efficacy, immediately cured the cough which has never yet returned (18 months).

45. SPASM OF THE TENSORS OF THE VOCAL CORDS.

Aphonia spastica. Aphthongia laryngea spastica.

A spasmodic and irregular contraction of the tensor muscles of the cords, with some associated spasm of the adductor muscles; the thoracic muscles are also frequently involved.

This affection is one of the "occupation neuroses," and analogous to "writers' cramp," in fact it may occur in connection with the latter disease; hence Morell Mackenzie suggested that it should be called "speakers' cramp." It consists of a spasm of the muscles of the larynx, together with disturbance of their co-ordinating power. The cases described by Prosser James, under the heading of "Stammering of the Vocal Cords," should be included in this category. In the

most marked form the greater the effort the patient makes, the less voice he produces. In the less severe varieties the patient is able to speak a few words in his ordinary tone of voice; then he either fails to articulate or does so in a hoarse tone; and this is, in its turn, followed by the normal voice. In some cases the spasm is so prolonged that it leads to a slight degree of cyanosis.

On laryngoscopic examination, the cords, in the severe cases, may be seen to be so closely adducted during phonation that there is no opening for the expiratory current of air; in the less severe forms the cramp-like spasm is limited to the anterior part of the cords, and it is only momentary. During respiration the appearances are quite normal. In another variety of phonatory spasm the patient is unable to control the pitch of his voice. This is much the same condition as occurs when the voice "breaks." It persists during life. No laryngoscopic appearances have been recorded.

Prognosis.—Up to the present time but little success has attended the treatment of these cases; in a few well marked examples there has been improvement, but the majority have defied all the methods of treatment to which they have been submitted.

Treatment.—The first thing to be done is to insist upon the systematic employment of vocal gymnastics and lessons in elocution. The patient should be taught to breathe properly and to thoroughly inflate the lungs before attempting phonation. The constant current applied to the brain and spine is said to be more useful than its local application. Nervine tonics, such as strychnine, iron, and arsenic, may be administered should the patient seem to require them. The nose, naso-pharynx, pharynx, and larynx should be

carefully examined, and should any abnormal condition exist, this should be appropriately treated.

As illustrating the reflex origin of aphonia spastica, Jonquièrè records a case in which cure was effected by pressure on the ovaries.

46. DIPLOPHONIA.

Diplophonia is a term employed to denote the simultaneous production, during phonation, of two tones, differing in pitch. E. C. Morgan, who has written an able article on this affection, with a bibliography, describes it under the heading of "Diphthonia or Double Voice." Temporary diplophonia may be produced by pellets of mucus adhering to the free border of the vocal cords.

Gibb had a case in which diplophonia resulted from a wound of the left vocal cord. It occasionally results from the presence of a nodule on the vocal cord, or it may come on from paresis, as the result of chronic laryngeal catarrh.

Treatment must be directed to the removal of any local abnormal conditions.

47. MOGIPHONIA.

Fraenkel describes under this name an "occupation neurosis" occurring in singers, clergymen, and other professionals who require to use the voice much. It consists in a painful feeling of fatigue and failure of the voice. After using the voice for a little time, there may be inability to utter a sound, but this only occurs in the professional part of phonation, viz., the preacher

for preaching, and the singer for singing. The condition is one of rapid exhaustion of the muscular contractility of the larynx. Laryngoscopically, Fraenkel describes loss of tension in the cords. Bresgen has seen similar cases associated with intra-nasal disease, and one of us (F. de H. H.) has seen it with enlargement of the lingual tonsil.

Treatment.—The peculiar use of the voice, such as singing, preaching, &c., which led to the trouble, must be forbidden. In his cases, Fraenkel used massage over the larynx with excellent effect, forty or fifty strokes daily on each side from above, downward. Any local abnormal condition of the nose or throat must receive appropriate treatment.

48. INSPIRATORY SPASM.

Perverted Action of the Vocal Cords.

In this affection the voice remains normal, but on every attempt at inspiration, the vocal cords, instead of separating, approximate in a convulsive manner, and may cause grave interference with respiration (see p. 528).

Treatment.—As this is a purely neurotic condition, the general health of the patient must be seen to, and nervine tonics, antispasmodics, and the cold douche ordered.

49. LARYNGEAL CHOREA.

Under the head of laryngeal chorea have been included cases in which not only the adductors of the larynx, but also the expiratory muscles of the chest and

abdomen are affected, producing a barking cough. There can be no advantage in grouping these cases with chorea, from which they differ essentially, inasmuch as in every instance some particular set of muscles is called into action, and the sound produced does not vary, whereas the very essence of chorea is a disorderly involuntary movement, so that it is impossible to predicate as to what will be the next move of the patient.

The difficulty of making a laryngoscopic examination in patients suffering from general chorea is so great, that it is hardly possible to say whether the laryngeal muscles also participate in the choreic condition. There is a growing consensus of opinion that the term chorea of the larynx should either be entirely given up, or restricted to cases in which true choreic movements of the vocal cords occur in association with similar movements in other parts of the body.

50. LARYNGEAL AFFECTIONS IN TABES.

Four kinds of affections have been met with in the larynx in connection with locomotor ataxy, viz., disturbances of sensation, which include anæsthesia, hyperæsthesia, paræsthesia, or more defined sensations such as feelings of constriction; spasm of the adductor muscles of the larynx; paralysis of the abductors; and inco-ordination of the laryngeal muscles. To the second form the term "laryngeal crisis" has been applied. In the majority of cases in which laryngeal crises occur, there is, in addition to the spasm of the adductors, some loss of power, or even paralysis of the abductor muscles,

but the two conditions may be independent of one another, or there may be mixed cases.

Paralysis of the vocal cords is not an uncommon initial symptom of tabes, and may precede other evidences by some years, so that patients may consult laryngologists on account of trouble referable to the larynx, when the existence of abductor paralysis should lead to a careful investigation, and the recognition of tabes. As a rule, laryngeal crises do not occur until the tabid symptoms are well established, but they may represent the earliest symptoms of the disease.

Morbid Anatomy and Pathology.—The changes in tabes complicated with laryngeal symptoms, are met with in the vagus, and more especially in the recurrent laryngeal nerves; on the other hand, the superior laryngeal has always been found exempt. The changes consist in atrophy of the nerves and interstitial sclerosis.

Semon explains the onset of the crises by the hypothesis of an increased latent irritability of the adductor centres. A peripheral irritation, passing along the centripetal fibres of the superior laryngeal nerve to these centres, instead of giving rise, as under ordinary circumstances, to a simple attack of cough, starts off spasmodic cough, spasm of the glottis, and general convulsions, owing to the increased irritability of the centres in question. According to Burger, there is also present in these cases an irritation in the sensory area which can cause, either directly or indirectly, spastic contraction of the glottis closers.

Symptoms.—The symptoms of a laryngeal crisis are usually preceded by uncomfortable sensations located in the throat, followed by a succession of fits of coughing resembling whooping-cough. Dyspnœa accompanies the attacks, and sometimes they are

followed by convulsions and loss of consciousness. In exceptional cases the spasm is so intense that the patient rapidly becomes cyanosed, and death has occurred under these circumstances. During the attack, the vocal cords are in the median line; in the intervals, the larynx may be found perfectly normal, but, as already mentioned, there is usually more or less impairment of abduction. Crises can, at times, be elicited by causing the patient to drink a glass of water, by touching the larynx with a probe, or by irritating the nasal fossæ.

In the third form of tabid laryngeal affection, which is by far the most common variety, we have to do with paresis or paralysis of the vocal cords, more or less permanent in nature, paralysis of the abductors being the most common form. Unlike the ocular palsies of tabes, the laryngeal palsies usually progress up to the death of the patient; there may, however, be a change of form, *i.e.*, a double abductor paralysis has been known to pass into a complete double paralysis and consequent cadaveric position of the vocal cords. Increased rapidity of the pulse is often found in conjunction with the abductor paresis of tabes.

The remaining laryngeal affection of tabes is a true ataxy of the cords. Inco-ordination of the laryngeal muscles is, however, rare. During regular and deep respiration, irregular movements of the vocal cords have been seen, *i.e.*, the vocal cords executed two or three movements of abduction or adduction instead of one. On phonation, the cords have been seen to separate suddenly as though by a sudden shock.

Prognosis.—It need scarcely be said that this is as unfavourable as that of the general disease of which the laryngeal symptoms are only a part.

Treatment.—Inasmuch as the crises may be determined in a reflex manner by irritating the mucous membrane of the upper respiratory track, drugs, such as bromide of potassium, which have a general sedative effect, and cocaine, which has a local action, should be employed. The food should be liquid or semi-solid, and unirritating, so that it is unlikely to induce a spasm during swallowing.

51. LARYNGEAL AFFECTIONS IN PARALYSIS AGITANS, DISSEMINATED SCLEROSIS, LABIO-GLOSSO-LARYNGEAL PARALYSIS, AND SYRINGO-MYELIA.

In a patient suffering from paralysis agitans who was carefully examined by A. Rosenberg, there was a difficulty in emitting a prolonged sound, and above all, in maintaining the sound at its initial pitch, the voice always tending to fall. Laryngoscopically, the cords were seen to approach promptly, but they did not maintain this position long. At another time, the cords did not appear to obey the will immediately—there was a relatively long interval between the command and the commencement of phonatory adduction. A narrow elliptical chink was left between them, which increased or diminished in a rhythmic fashion corresponding with the movements of the head and upper extremity.

In disseminated sclerosis one of the phenomena most generally noted is the monotony of the voice, this monotony being sometimes interrupted by intervals of sudden change of pitch. The speech is slow, accented,

and laboured, and it has been described as "scanning." Leube has drawn attention to the sudden alterations between tension and relaxation of the vocal cords; in other words, the cords are in a state of oscillation, assimilating the tremors of the limbs, and the movements of the vocal cords are slow.

In labio-glosso-laryngeal paralysis, Kussmaul, in two cases, discovered a loss of the pharyngeal and laryngeal reflexes some months before any paralytic affection appeared. The abolition of these reflexes may give rise to attacks of suffocation, due to the entrance of foreign bodies into the air-passages, or to patches of broncho-pneumonia.

Laryngeal symptoms do not usually appear early in the disease, nor are they very marked. Gowers points out that though paresis of the laryngeal muscles is frequently met with, "laryngeal palsy rarely becomes complete, and it is still rarer for the power of abduction to be specially lost, common as abductor palsy is in some other forms of central degeneration." The abductors are, however, sometimes affected on both sides, but more often on one. Laryngeal manifestations may be the sole clinical expression of the extension to the bulb of spinal lesions. Laryngeal crises, which are so common in tabes, are hardly ever met with in bulbar paralysis.

In syringo-myelia, according to Cartaz, sensory affections are more common than motor; they occur, however, independently of each other, corresponding generally to the side most affected. Cases of unilateral abductor paralysis, and paralysis of one vocal cord with and without affections of palate and pharynx and of trapezius have been recorded.

The disturbances in the act of swallowing, difficulty

of respiration, and irregularity of the action of the heart, together with the paralysis of the vocal cords, point to implication of the vagus centre.

52. ALTERED CONDITIONS OF THE SENSORY NERVES.

- (1) *Anæsthesia*, (2) *Hyperæsthesia*, (3) *Paræsthesia*,
(4) *Neuralgia*.

Of these, anæsthesia is the most important. It may arise as a result of peripheral neuritis as in diphtheria, syphilis or lead poisoning, or as a result of injury to the nerve trunk in its course. In other instances it is of central origin, *e.g.*, bulbar lesions, tabes, epilepsy, general paralysis, and in hysteria. Accompanying diphtheritic paralysis, it may cause serious results, as food may enter the air-passages, in consequence of the loss of sensation in the laryngeal mucous membrane. In these cases patients must be fed by means of the œsophageal tube, care being taken to ensure the tube passing down the œsophagus, and not down the larynx. Foreign bodies hardly ever enter the larynx in hysterical anæsthesia.

Anæsthesia may be produced artificially, by the inhalation of chloroform (hence the importance of administering the drug on an empty stomach, so as to prevent vomiting and the passage of the vomit into the larynx) and by the application of cocaine.

Morbid Anatomy and Pathology.—Ott has observed anæsthesia of one half of the larynx caused by syphilitic degeneration of the vagus at its origin. It is also met with in disease of the superior laryngeal nerve.

For instance, the anæsthesia accompanying diphtheria is due to neuritis of this nerve. The lesion causing the anæsthesia may be seated in the medulla, as in labio-glosso-laryngeal paralysis, or at the base of the brain, or even in the cerebral hemisphere; thus a hæmorrhage or softening in the posterior part of the internal capsule may give rise to hemi-anæsthesia of the opposite side of the body. Anæsthesia of the pharynx and larynx is said to be an early symptom of general paralysis of the insane.

Treatment.—In diphtheritic and hysterical cases, the administration of iron and strychnine, the latter, if necessary, subcutaneously $\frac{1}{50}$ to $\frac{1}{10}$ grain, will almost invariably have a good effect. The alternative employment of galvanic and faradic electricity will usually accelerate the cure. One electrode should be placed over the thyroid cartilage, and the other in the anterior part of the pyriform sinus, so as to get as near as possible to the course of the superior laryngeal nerve.

Hyperæsthesia. Paræsthesia.

By hyperæsthesia is understood an increased sensibility of the laryngeal mucous membrane. Sometimes there is irritation, giving rise to voluntary cough; at other times the cough is involuntary and quite irrepressible. Occasionally, hyperæsthesia only manifests itself during phonation, and then it may give occasion to a veritable phonophobia. There is, however, a great difference, normally, in the amount of response to artificial stimulation of the laryngeal mucous membrane. The mucous membrane of the larynx is usually hyperæsthetic in carcinoma and tuberculosis of this organ, the same is true in gouty and rheumatic laryngitis.

By paræsthesia is meant a perversion of sensation, *i.e.*, a scalding, tickling, or pricking sensation. In cases of greater severity the patient complains of the sensation of the presence of a foreign body, such as a hair, or a crumb, which he tries to expel by coughing or clearing the throat. Hyperæsthesia and paræsthesia frequently occur together, and sometimes the one alternates with the other. Sometimes such sensations are the result of obvious lesions, *e.g.*, lingual tonsil hypertrophy, granular pharyngitis, tonsillar calculi, naso-pharyngeal affection, &c. Often, however, these regions are apparently quite healthy but the patients are themselves neurotic, and hence such disordered sensations frequently affect hysterical females, anæmic patients, neurasthenics, especially those exhausted by seminal losses or venereal excess. Such abnormal sensations are often noted in the early stages of tubercular laryngitis and should be of significance in persons predisposed to this disease.

Localisation of sensation in the larynx is very inexact, as patients may refer to it, pain arising in the trachea or œsophagus.

Both hyperæsthesia and paræsthesia of the larynx may be due to the immoderate use of alcohol or tea; these symptoms are aggravated by disordered conditions of the stomach, or they may be the expression of irritation reflected from other organs, *e.g.*, the uterus or ovaries.

Treatment.—Attention should be paid to the general health; stomach and other visceral disorders should be appropriately treated, and if possible any local cause of irritation removed. Bromide of potassium is usually of service. Locally, sedatives, such as cocaine or morphine, may be applied in solution. The continuous current has been employed with advantage.

Neuralgia.

A pure neuralgia of the larynx, *i.e.*, attacks of pain independent of any organic disease, is of rare occurrence; it has been observed as a result of malarial poisoning. On the other hand, pain of a neuralgic character is frequently met with in cases of cancer or tuberculosis of the larynx, and occasionally in patients of a gouty or rheumatic diathesis, or in those suffering from anæmia.

Treatment.—In cases of pure neuralgia, the general treatment must be the same as for neuralgia in other parts of the body. The monobromide of camphor in 3-grain doses has been recommended in these cases. The continuous current in sittings of four to five minutes, one pole inserted in the larynx, over the painful spot, and the other externally, has been found useful. Externally, menthol, or camphor and chloral, may be applied to the larynx. Any organic disease present should receive attention.

53. LARYNGEAL VERTIGO.

This term has been applied by Charcot to attacks of giddiness, with or without loss of consciousness, and preceded by coughing.

Since attention was first directed to the subject by Charcot, in 1876, cases of the kind have been from time to time recorded.

In 21 of the 27 cases which I (F. de H. H.) have collected, the sex is stated, and it is a remarkable fact that in all but two, men were attacked, and usually at the middle period of life.

On physical examination, no very striking or constant

signs are to be detected ; granular pharyngitis, enlargement of the faucial or lingual tonsils, chronic laryngeal or bronchial catarrh, are the conditions most frequently seen. Sommerbrodt's patient had a laryngeal polypus, the removal of which put an end to the attacks. Some of the patients have been gouty or arthritic.

The exact nature of the attack has not yet been definitely settled. By some it is regarded as being due to a congestive condition of the cerebral vessels, brought about by the interference with the return of blood from the brain, consequent on the paroxysm of coughing. As a result of the cerebral congestion there is disturbance of the function of the centre of equilibrium, giving rise to giddiness. By Massei, laryngeal vertigo is placed in line with epilepsy, and he refers it to an irritation of the vagus. Charcot regards it as analogous to Menière's disease, and vertigo *à stomacho læso*, the afferent nerve being the superior laryngeal, and according to his view the term "laryngeal vertigo" should be restricted to cases in which the loss of consciousness appears independently of the passive congestion brought about by the cough. Krishaber makes use of the term "spasm of the glottis of adults," in describing the condition ; and we think that McBride, in drawing attention to Weber's experiments, supplies what is deficient in Krishaber's explanation. Weber has shown, experimentally, that forced expiration with closed glottis causes weakening and eventually stopping of the heart's action, giving rise to vertigo and even loss of consciousness. Elsberg points out that it is to the very completeness of the spasm of the adductors that the brief duration of the attack and the safety of the patient is due, the total spasm producing unconsciousness, which is followed by relaxation of the spasm.

Symptoms.—The attack usually commences with a feeling of discomfort or irritation, referred to the larynx; thereupon the patient starts coughing, and, after a paroxysm more or less violent, he suddenly becomes giddy, and may fall to the ground unconscious; loss of consciousness, when it does occur, is, however, only of momentary duration. Convulsive movements are sometimes present. The tongue is only rarely bitten. Involuntary urination does not occur. The face is generally congested, but it may be pale. The attack is not usually followed by any appearance of heaviness, but occasionally the patient has some confusion of mind. The frequency of the attacks varies considerably. In one of Charcot's cases they amounted to fifteen in one day. Cartaz's first patient had only two attacks in all. Massei's first patient had but the one attack.

Diagnosis.—Laryngeal vertigo must be distinguished from the laryngeal crises of tabes and from *petit mal*. The loss of knee-jerk, the condition of the pupils, the lightning pains and other characteristic symptoms of tabes, will usually suffice to exclude that disease. In *petit mal* though there is giddiness and temporary loss of consciousness, the attack is not preceded by a paroxysm of cough. As regards the biting of the tongue in laryngeal vertigo, this has been attributed to the violence of the cough; it is, moreover, not a common symptom. The absence of involuntary urination, which has been constantly noted in laryngeal vertigo, is another distinguishing point between this disease and epilepsy. It is important that the nasal passages should be examined, as the vertigo may be of aural origin, dependent on the nasal condition.

Prognosis.—Though the attacks are somewhat alarming in appearance, they are not very dangerous.

Of the twenty-seven cases to which reference has been made, death occurred in two; in one the patient died in an asthmatic paroxysm, but in the other it was directly due to the attack.

Treatment.—Should there be any affection of the pharynx, such as granular condition, elongated uvula, enlarged lingual tonsil, or chronic laryngeal catarrh, this should receive appropriate local treatment. In a case under my (F. de H. H.) care, the symptoms disappeared after granular pharyngitis had been treated with the galvano-cautery. Counter-irritation over the larynx, and the internal administration of bromide of potassium, have usually had good results. Spraying the pharynx and larynx with a five per cent. solution of cocaine, as soon after the commencement of the attack as possible, is well worth a trial.

54. RHEUMATIC AFFECTIONS OF THE LARYNX.

It might have been thought that the larynx, from its exposed position, and the amount of fibrous tissue in its structure, would be particularly liable to be attacked by rheumatism. This does not, however, seem to be the case. Archibald Garrod, for instance, makes no mention of the larynx being affected by rheumatism. Still, the possibility of a painful affection of the larynx, which resists treatment, being of a rheumatic origin, should be borne in mind, and the salicyl compounds tried. Larauza reports the case of a physician, aged 27, with aphonia supposed to be of rheumatic origin. Laryngoscopic examination showed general hyperæmia of the larynx, with paresis of the thyro-arytenoid muscles.

After the failure of a long course of treatment, sodium salicylate was tried, with speedy success.

Ingals believes that laryngeal rheumatism is often mistaken for neuralgia. Like other rheumatic manifestations, it occurs most frequently in men, and most commonly in spring and autumn, and almost all the patients have inherited or acquired the rheumatic diathesis. There are no anatomical characteristics of the disease; the chief symptom is pain, radiating in various directions, but chiefly to the cornua of the hyoid bone, the pain being increased by pressure. The pain comes and goes in the manner characteristic of rheumatic affections, and it is relieved by the treatment which has been found most useful in this diathesis.

Hinkel draws attention to a form of sore throat which is characterised by sudden pain on swallowing and slight elevation of temperature. The most painful spot is seated just behind the cricoid cartilage, or outside the superior cornu of the thyroid, or in the posterior wall of the pharynx. The mucous membrane is congested in a patchy way. Alkaline gargles, warmth, and alkalies internally, effect a rapid cure. In some cases a severe cough, of a dry and painful character, is met with.

FORMULÆ.

GARGLES.

1. ℞ Acidi Borici gr. x
 Boracis gr. x
 Glycerini ℥x
 Aquam ad ℥j
 Misce.
2. ℞ Acidi Carbolici liquefacti ℥iij
 Glycerini ℥j
 Aquam ad ℥j
 Misce.
3. ℞ Acidi Tannici gr. xij
 Spiritus Vini Rectificati ℥vj
 Aquam Camphoræ ad ℥j
 Misce.
4. ℞ Acidi Tannici ℥vj
 Acidi Gallici ℥ij
 Aquæ ℥j
 Misce.
5. ℞ Boracis gr. xx
 Glycerini ℥xx
 Aquam ad ℥j
 Misce.
6. ℞ Liquoris Potassii Permanganatis ℥ij
 Aquam ad ℥j
 Misce.
7. ℞ Potassii Chloratis gr. xij
 Glycerini ℥j
 Aquam ad ℥j
 Misce.

LOTIONS.

8. ℞ Extracti Opii Liquidi ℥xx
 Liquoris Plumbi Subacetatis diluti ℥j
 Misce.
9. ℞ Plumbi Acetatis gr. ij
 Acidi Acetici diluti ℥ij
 Aquæ ℥j
 Misce.
10. ℞ Acidi Borici gr. iv
 Cocainæ gr. ij
 Aquæ Rosæ ℥j
 Misce.
11. ℞ Hydrargyri Perchloridi gr. $\frac{1}{8}$
 Aquæ ℥j
 Misce.
12. ℞ Liquoris Ammonii Acetatis ℥j
 Spiritus Vini Rectificati ℥ij
 Aquam ad ℥j
 Misce.

MIXTURES.

13. ℞ Liquoris Ammonii Acetatis ℥iij
 Spiritus Ætheris Nitrosi ℥xx
 Aquam Camphoræ ad ℥j
 Misce.
14. ℞ Liquoris Ammonii Acetatis ℥iij
 Spiritus Ætheris Nitrosi ℥xx
 Tincturæ Camphoræ compositæ ℥xxx
 Oxymellis Scillæ ℥xxx
 Aquam Menthæ Piperitæ ad ℥j
 Misce.
15. ℞ Caffeinæ Citratis gr. ij ad v
 Aquæ ℥j
 Misce.

(Or the granular effervescent hydrobromate of Caffeine [gr. j in ℥j] may be ordered).

16. R̄ Apomorphinæ Hydrochloratis . . . gr. $\frac{1}{16}$
 Morphinæ Hydrochloratis . . . gr. $\frac{1}{24}$
 Acidi Hydrochlorici diluti . . . ℥ijss
 Syrupi Pruni Virginianæ . . . ℥xxx
 Aquam ad . . . ℥jss
 Misce.
17. R̄ Liquoris Morphinæ Hydrochloratis . . . ℥iij
 Spiritûs Chloroformi . . . ℥iij
 Glycerinum ad . . . ℥j
 Misce.
18. R̄ Liquoris Trinitrini . . . ℥ $\frac{1}{2}$ ad j
 Spiritûs Ætheris Nitrosi . . . ℥xx
 Tincturæ Cardamomi compositæ . . . ℥x
 Aquam Chloroformi ad . . . ℥j
 Misce.
19. R̄ Tincturæ Ferri Perchloridi . . . ℥xx
 Glycerini . . . ℥xx
 Spiritûs Chloroformi . . . ℥xv
 Aquam ad . . . ℥j
 Misce.
20. R̄ Ferri Sulphatis . . . gr. ij
 Magnesii Sulphatis . . . ℥j
 Acidi Sulphurici diluti . . . ℥x
 Spiritûs Chloroformi . . . ℥x
 Aquam Menthæ Piperitæ ad . . . ℥j
 Misce.
21. R̄ Ferri et Ammonii Citratis . . . gr. x
 Liquoris Arsenicalis . . . ℥iij
 Spiritûs Chloroformi . . . ℥x
 Aquam ad . . . ℥j
 Misce.
22. R̄ Quininæ Sulphatis . . . gr. ij
 Acidi Sulphurici diluti . . . ℥iij
 Aquæ . . . ℥j
 Solve et adde
 Potassii Iodidi . . . gr. v
 Misce.

23. R̄ Liquoris Sodii Arsenatis ℥iij
 Sodii Hypophosphitis gr. x
 Tincturæ Cardamomi compositæ ℥x
 Aquam Chloroformi ad ʒj
 Misce.
24. R̄ Potassii Bromidi gr. x ad xx
 Liquoris Arsenicalis ℥iij
 Tincturæ Gentianæ compositæ ℥xxx
 Aquam ad ʒj
 Misce.
25. R̄ Liquoris Hydrargyri Perchloridi ʒss
 Sodii Iodidi gr. iiss
 Syrupi ʒj
 Aquam Menthæ Piperitæ ad ʒj
 Misce.
26. R̄ Hydrargyri Biniodidi gr. $\frac{1}{20}$
 Potassii Iodidi gr. v
 Infusi Quassiaæ ʒj
 Misce.
27. R̄ Potassii Iodidi gr. v
 Liquoris Hydrargyri Perchloridi ʒj
 Infusum Quassiaæ ad ʒj
 Misce.
28. R̄ Potassii Iodidi gr. v
 Spiritûs Ammoniaæ Aromatici ℥xx
 Tincturæ Gentianæ compositæ ℥xx
 Aquam ad ʒj
 Misce.
29. R̄ Magnesii Sulphatis ʒj
 Magnesii Carbonatis gr. x
 Tincturæ Cardamomi compositæ ℥xv
 Aquam Chloroformi ad ʒj
 Misce.
30. R̄ Ammonii Carbonatis gr. x
 Sodii Bicarbonatis gr. xv
 Aquæ ʒj
 et
 Acidi Citrici gr. xvij
 Aquæ ʒj

OINTMENTS.

31. R̄ Acidi Carbolici gr. xij
 Adipis Benzoati ʒj
 Misce.
32. R̄ Liquoris Atropinæ Sulphatis . . . ʒj
 Olei Eucalypti ʒj
 Vaselinum ad ʒj
 Misce.
33. R̄ Olei Eucalypti ʒj
 Vaselinum ad ʒj
 Misce.
34. R̄ Unguenti Hydrargyri Nitratis . . ʒj
 Vaselinum ad ʒj
 Misce.

PAINTS AND APPLICATIONS.

35. R̄ Acidi Chromici gr. x
 Aquæ destillatæ ʒj
 Misce.
36. R̄ Argenti Nitratis . gr. xvj, xxiv, xxxvj, xlvij, &c.
 Aquæ destillatæ ʒj
 Misce.
37. R̄ Cupri Sulphatis gr. xv ad xx
 Glycerini ʒij
 Aquam ad ʒj
 Misce.
38. R̄ Ferri Perchloridi gr. xxx ad xl
 Glycerini ʒij
 Aquam ad ʒj
 Misce.
39. R̄ Ferro-Aluminis gr. xl
 Glycerini ʒij
 Aquam ad ʒj
 Misce.

40. R̄ Hydrargyri Perchloridi . . . gr. $\frac{1}{4}$
 Spiritûs Vini Rectificati . . . ʒij
 Aquam ad . . . ʒj
 Misce.
41. R̄ Zinci Chloridi . . . g. x ad xxx
 Acidi Hydrochlorici diluti . . . ℥x ad xx
 Glycerini . . . ʒij
 Aquam destillatam ad . . . ʒj
 Misce,
42. R̄ Papain . . . gr. ij
 Acidi Lactici . . . ℥ij
 Aquæ . . . ℥xxx
 Misce.
 (To be freshly prepared when wanted.)
43. R̄ Menthol
 Paraffinum liquidum (10 per cent. solution).
44. R̄ Thymol . . . gr. ss
 Spiritûs Vini Rectificati . . . ʒss
 Glycerini . . . ʒss
 Aquam ad . . . ʒj
 Misce.
45. R̄ Iodi . . . gr. v ad xx
 Potassii Iodidi . . . gr. x ad xxx
 Olei Menthæ Piperitæ . . . ℥iij
 Glycerini . . . ʒj
 Misce.

PILL.

46. R̄ Zinci Valerianatis . . . gr. j
 Pilulæ Galbani compositæ . . . gr. ij
 Misce.

POWDERS.

47. R̄ Iodoformi . . . gr. j
 Acidi Borici . . . gr. j
 Morphinæ Hydrochloratis . . . gr. $\frac{1}{6}$
 Cocainæ Hydrochloratis . . . gr. $\frac{1}{6}$
 Misce.

48. ℞ Pulveris Lobeliæ
 Pulveris Stramonii
 Pulveris Theæ (Black Tea)
 Potassii Nitratis
 Partes æquales.*
 Misce.

SOLUTION.

49. ℞ Cocainæ Hydrochloratis . . . gr. lxxx
 Resorcin gr. xl
 Aquæ destillatæ ℥j
 Misce.

SPRAYS.

50. ℞ Sodii Bicarbonatis . . . gr. iiiss
 Sodii Chloridi gr. iiiss
 Boracis gr. iiiss
 Sacchari Albi gr. vij
 Aquæ ℥j
 Misce.

(To be mixed with an equal quantity of hot water.)

- 51 ℞ Sodii Bicarbonatis . . . gr. viiss
 Boracis gr. viiss
 Listerine† ℥ij
 Aquam ad ℥j
 Misce.

52. ℞ Acidi Carbolici . . . gr. j ad ij
 Sodii Bicarbonatis . . . gr. vj
 Boracis gr. vj
 Glycerini ℥xx
 Aquam ad ℥j
 Misce.

* See "The Extra Pharmacopœia," Martindale, 9th edition, p. 383.

† See p. 584.

53. R̄ Acidi Borici gr. vj
 Boracis gr. vj
 Sodii Chloridi gr. iij
 Aquæ ʒj

Misce.

54. R̄ Sodii Bicarbonatis gr. xij
 Sodii Chloridi gr. ij
 Acidi Carbolici gr. iss
 Aquæ ʒj

(To be added to half a tumblerful of lukewarm water. This prescription can be obtained in tabloid form.)

55. R̄ Sodii Chloridi gr. v
 Liquoris Potassii Permanganatis ℥v
 Aquam ad ʒj

Misce.

56. R̄ Zinci Sulphatis gr. v ad x
 Aquæ ʒj

Misce.

57. R̄ Potassii Chloratis gr. x
 Aquæ ʒj

Misce.

58. R̄ Resorcin gr. v
 Aquæ ʒj

Misce.

59. R̄ Liquoris Iodi ℥vj
 Acidi Carbolici liquefacti ℥iij
 Aquam ad ʒj

Misce.

60. R̄ Papain gr. xvj
 Acidi Lactici ℥xvj
 Aquam ad ʒj

Misce.

61. R̄ Ferri Perchloridi gr. iij
 Glycerini ℥x
 Aquam ad ʒj

Misce.

62. ℞ Ferro-Aluminis gr. ij
 Glycerini ℥x
 Aquam ad ℥j
 Misce.
63. ℞ Zinci Chloridi gr. ij
 Acidi Hydrochlorici diluti ℥ij
 Glycerini ℥xv
 Aquam destillatam ad ℥j
 Misce.
64. ℞ Glycerini Acidi Tannici ℥xx ad lxx
 Aquam ad ℥j
 Misce.
65. ℞ Glycerini Aluminis ℥xxxvj
 Aquam ad ℥j
 Misce.

NOTE.—The solutions for spraying the nostrils should be at a temperature of 100° F.

66. ℞ Menthol gr. x
 Olei Eucalypti ℥v
 Olei Cinnamomi ℥v
 Paraffinum liquidum ad ℥j
 Misce.
67. ℞ Naphthalene gr. xii
 Olei Cinnamomi ℥v
 Paraffinum liquidum ad ℥j
 Misce.

INHALATIONS.

68. ℞ Tincturæ Benzoini compositæ.
69. ℞ Thymol gr. vi
 Spiritûs Vini Rectificati ℥j
 Magnesii Carbonatis levis gr. ij
 Aquam destillatam ad ℥j
 Misce.
70. ℞ Creosoti lxxx
 Magnesii Carbonatis levis gr. xxx
 Aquam destillatam ad ℥j
 Misce.

71. R̄ Olei Pini Sylvestris ℥xl
 Magnesii Carbonatis levis gr. xx
 Aquam destillatam ad ʒj

Misce.

Of any of these a teaspoonful in a pint of water at 140° F., should be used for each inhalation.

72. R̄ Balsami Peruviani ʒvss
 Spiritus Vini Rectificati ʒijss

Misce.

Twenty to thirty drops in a pint of water at 140° F. for inhalation.

CARBOLIZED SMELLING SALTS.

73. R̄ Acidi Carbolic liquefacti ʒj
 Ammonii Carbonatis ʒij
 Pulveris Carbonis Ligni ʒij
 Tincturæ Benzoini compositæ ʒj
 Olei Lavandulæ ℥vj
 Liquoris Ammonia fortis q. s.

Misce.

74. Liebig's original formula for essence of meat:—

Mix one pound fresh minced lean beef with one pint of distilled water, to which two to four drops of hydrochloric acid and fifty to ninety grains of common salt have been added. After standing in the cold for one hour, strain through a hair sieve without pressure, and re-strain until the filtrate be clear, adding sufficient water on the sieve to obtain one pint of essence.

Listerine* contains the essential principles of thyme, eucalyptus, baptisia, gaultheria, and mentha arvensis. Each fluid drachm also contains two grains of benzo-boracic acid. Listerine is a useful and pleasant antiseptic. It may be used in the proportion of one part to two of water.

75. R̄ Sodii Chloridi ʒij
 Acidi Borici gr. xxx
 Ammonii Chloridi gr. xxx
 Camphoræ gr. j

* See formula No. 51.

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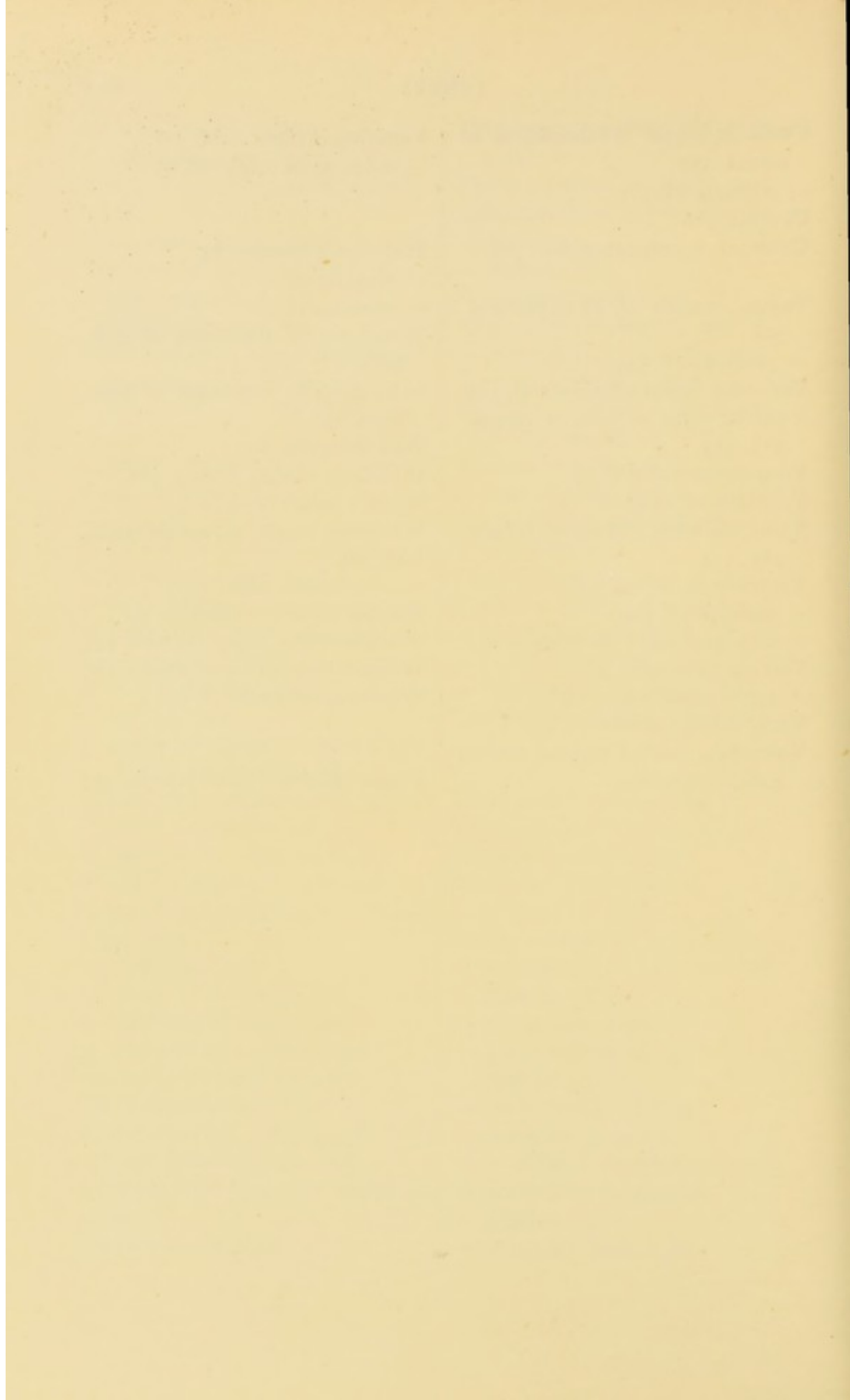
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