THE INFERIOR TURBINATED BONE: ITS FUNCTION, DISEASES, AND TREATMENT.¹

BY WENDELL C. PHILLIPS, M.D.,

PROFESSOR OF DISEASES OF THE EAR IN THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; SURGEON TO THE MANHATTAN EYE AND EAR HOSPITAL, AURAL DEPARTMENT.

THE topic assigned to me for this paper calls for a consideration of the various diseases and deformities of the inferior turbinated bone. Anatomically this bone is also called the maxilloturbinal because of its attachment to the inferior maxillary. This peculiar scroll-shaped bone, together with its covering of elastic tissue, bloodvessels, and mucous membrane, constantly exposed to both the incoming and outgoing currents of air, which may be laden with dust and other deleterious matter, and further subjected to the discharges and emanations from the interior of the nose and accessory sinuses, is peculiarly liable to disease.

Respiration, olfaction, and phonation constitute the threefold function of the nasal cavities. The normal secretions furnish moisture and warmth for the inspired air, and at the same time catch and hold in check dirt and other particles which if fully inspired might be harmful.

The coarser particles are caught by the larger stiff hairs found in the vestibule, while the finer particles are caught by the moisture, become entangled with the viscid mucus, and are gradually forced toward the outer world by the constant vibrations of the epithelium.

The demands made upon the intranasal structures in carrying out the purposes of these functions, together with the necessary exposure of the delicately constructed tissue both to atmospheric and mechanical irritation, create a tendency both to acute and chronic inflammation as well as various other diseases.

The intranasal diseases, thus relating to the inferior turbinated bone, while not the most common or the most serious, are of sufficient frequency to demand the attention of the rhinologist.

The inferior turbinated region has but little to do with olfaction for the reason that the olfactory filaments are chiefly located higher up. In the normal state they have but little to do with the process of phonation, but when hypertrophied or otherwise diseased they may produce marked modification of this function.

This bone forms the upper boundary of the inferior meatus. Zuckerkandl,² who has been freely quoted by Bosworth, was the

¹ Read at the Annual Meeting of the Medical Society of the State of New York, January 29, 1905.

² Wiener medizinische Wochenschrift, 1884, No. 38, vol. xxxiv. pp. 1121-1125. Schwellgewebe der Nasenschleimhaut und dessen Beziehungen zum Respirationspalt. Diseases of the Nose and Throat, Bosworth, p. 82.

first to give an exact anatomical study of the mucous covering of the turbinated bones, and demonstrated positively the existence of tissues similar to true erectile tissue, which gives an explanation for the sudden expansion and contraction which may take place in these tissues.

Of the acute disease which may affect the tissue of the inferior turbinated bone and its coverings it will be necessary to mention that all acute infections which influence the mucous membrane of the nasal cavities in general exert the same influence upon the lower turbinated bone and no diagnosis of permanent hypertrophy may be ventured without first eliminating the possibility of acute inflammatory thickening. Among these, acute rhinitis, grip, the affections associated with the exanthemata, and the inflammations resulting from digestive and alimentary disturbances may be noted, the most common of all being acute rhinitis resulting from various causes. Of the neuroses, hay fever, hydrorrhœa, and anosmia are found associated with bogginess of these tissues. Waterlogged seems to be a suggestive term to apply to the turbinated tissues when they are subjected to the relaxing influences of the neuroses. Poisonous gases may also have an irritating influence resulting in severe inflammation. Tumors, both benign and malignant, may occasionally be found in this locality, although usually the inferior turbinated bone is not the primary location of the growth. The inferior turbinated bone may occasionally be the location of the development of myxomatous growths. Chronic rhinitis, long continued, may finally result in such changes in the soft tissues covering the inferior turbinated bone that a true hypertrophy results. The chief changes are in the connective tissue. Some form of operation is essential for the removal of the resultant hypertrophy.

Malformations and deformities of the inferior turbinated bone are more common than is generally supposed. Located as it is in a rather confined area, but little deformity or malformation can exist without more or less seriously interfering with respiration and drainage. When the deformities are such as to bring the bone into contact either with the nasal septum or the floor of the inferior meatus, such contact results in irritation and an increased tendency to intranasal inflammation. Many times the bone itself is more at fault than the hypertrophied tissues which cover it. That the bone itself becomes enlarged at times cannot be denied, but, on the other hand, when malformed it does give rise to distressing symptoms. While the inferior meatus may not be closely concerned in the process of respiration, yet when filled or nearly so by the enlarged or malformed bone, together with increased connective tissue, the process of respiration is notably affected. A not unimportant symptom connected with this same condition is interference with nasal drainage. The hygiene of the nose

cannot be properly maintained unless the inferior meatus is free or nearly so. The general health in individuals suffering with nasal obstruction due to disease or malformation of the inferior turbinated bone cannot, therefore, for the reasons above mentioned, be fully maintained. True hypertrophy of the inferior turbinated tissues is many times overlooked in making a diagnosis of intranasal disease.

As heretofore remarked, hyperæmia, congestion, and even severe inflammation are not to be considered as in any sense true hypertrophy; while, on the other hand, long-continued inflammation may and no doubt does result in true hypertrophy. When in doubt as to whether true hypertrophy exists, application of cocaine will suffice to make the diagnosis positive.

Of the malformations of the bone itself the most common and troublesome is the one where the scroll-like formation of the bone is incomplete, leaving the unattached edge widely separated from the body of the bone and contact either with the floor of the nostril or against the septum.

While hypertrophies and malformations are quite common, it must not be forgotten that atrophy will frequently be found. Such atrophy may be confined to the soft tissues, and in severe cases the bone itself is found to be nearly or wholly absent. Some have supposed that all atrophies in the intranasal chambers result from prolonged inflammations and hypertrophies, but at present the consensus of opinion seems to be that atrophic changes may and do take place without previous hypertrophy. There is no special treatment for atrophic conditions of this bone beyond those generally employed for the entire intranasal region under similar conditions.

Before speaking of the methods to be employed when operative interference is necessary, it may be well to mention some of the symptoms and appearances which may be found in connection with general hypertrophy and malformation of this bone. Probably the most prominent symptom is the sensation of intranasal pressure, and this symptom is much more marked when the inferior surface of the bone is in contact with the floor of the meatus. Often the hypertrophy involves the entire length of the bone, so that even the posterior end projects into the postnasal cavity, presenting the mulberry appearance so familiar to all rhinologists. Both phonation and respiration under these conditions will be seriously interfered with. Altered and abnormal secretions may also be mentioned as resulting from hypertrophy of this tissue. Occasionally the pressure symptoms amount to positive pain. The constant exposure of a patient to the difficulties heretofore described many times lead to nervous irritability and depression.

OPERATIONS. The removal of redundant portions of the hypertrophic tissue and bone should be resorted to when of sufficient

severity to give rise to the above-described symptoms, after a positive diagnosis of true hypertrophy or malformation has been made.

It might be mentioned at this point that intranasal surgery should never be resorted to, except for the removal or correction of such deformities and diseased conditions as may be positively demonstrated as producing serious symptoms or positive interference with the normal functions of these cavities.

Three general methods have been employed for the removal of hypertrophied tissue and enlarged or diseased turbinated bones:

1. By the use of escharotics.
2. The galvanic cautery.
3. The snare, scissors, saw, and knife.

It is scarcely necessary to say that previous to operation in these cavities all possible efforts should be made to render the surfaces as nearly aseptic as possible.

Of the escharotics, chromic acid heads the list. It should never be employed. The reaction from its use is severe, causing painful and troublesome symptoms, lasting several days. A large slough comes away after a few days, and some scar tissue results. For a time the hypertrophy seems to be reduced in size. This result, however, is but temporary and not of sufficient permanence to warrant its use.

Of the galvanic cautery practically the same may be said, although of course more destruction may be accomplished by its use. There are cases where a subcutaneous cauterization may be attempted, leaving the mucous membrane practically intact and some reduction of tissue effected. A few years ago this method was much in vogue, but is now rarely employed, and it may be said that the use of the galvanic cautery to reduce inferior turbinated hypertrophies has practically been relegated to the past.

At the present time the third method mentioned, in some of its forms, is usually employed. For the removal of posterior hypertrophies the wire snare remains the ideal instrument. The loop of wire is a slightly curved cannula, is carried backward until it engages the large soft mass making up the posterior hypertrophy. Gradually and slowly the mass is then cut through.

It is sometimes extremely difficult to snare these growths, and the operation is trying both to the patient and the operator. When it is possible to make use of the mirror in the throat, thus giving the operator a view of the field of operation, it is much easier to manipulate the loop. I have often found it necessary to delay the operation until the patient could be taught to properly control the throat so that a mirror could be employed.

Experience has shown that in the removal of posterior hypertrophies, even by the slow snare method, troublesome secondary hemorrhage sometimes occurs, and for several days subsequent to the operation such danger exists. It is also advisable in their

removal to consume from a half hour to an hour in cutting through the growth. When the anterior and middle portions of the bone are to be removed I have come to believe that the scissors are the most useful instrument for its accomplishment. Ordinary scissors cannot well be used, but a heavy angular pair should be employed. Those devised by Chevalier Jackson, of Pittsburg, seem to me to be well-nigh ideal. The jaws can easily be placed so that a definite amount of tissue and bone may be removed, and the operator need not be hampered by removing too much or too little tissue. To saw off a portion of this bone and through the soft tissue too much tearing is necessary, which subsequently interferes with the healing process. Some operators have suggested the advisability of first dissecting up the hypertrophied tissue and periosteum, then cutting away the bone only. To me this method seems to be ill advised, for the reason that the removal of the tissue as well as the bone is necessary. It has been my experience that the best results are obtained when a large portion of hypertrophied tissue and a considerable section of the bone are removed by the clean cut made by the heavy scissors. The healing is rapid, and after a re-establishment of proper drainage and respiration it is remarkable how soon the membrane covering the inferior turbinated bone assumes a healthy and normal aspect.

The after-treatment may be summed up in a few words. For the prevention of hemorrhage a spray of very weak adrenalin solution may be given to the patient, with directions to spray the nasal cavity every three or four hours for a period of two or three days. This, together with attempts to keep the surfaces clean, usually results in healing without evidence of infection of any kind. A word as to plugging the nostril after these operations. I never do it. Plugs in the nose are very painful, sometimes produce sloughing, and are quite unnecessary. For some years, however, it has been my custom to lay a very thin piece of absorbent cotton over the wound. This is first moistened with a 12 per cent. solution of acetotartrate of aluminum, to which may be added a few drops of diluted adrenalin. This does not plug the nostril, but does protect the wound, and the disinfectant properties of the acetotartrate aluminum render it safe to leave *in situ* for several days. I have made use of this method of after-treatment for several years, and have never had one case of secondary hemorrhage or infection during this time. This record of experience is sufficient to lead me to say that I would not again resort to the open-wound methods.

CONCLUSIONS. 1. Hypertrophy and deformities of the inferior turbinated bone may interfere with nasal respiration.

2. They also interfere with drainage.

3. They give rise to pressure symptoms, and subsequently to mental depression.

4. They further prevent proper intranasal hygiene.
5. True hypertrophy must not be confounded with congestion or inflammation.
6. Hypertrophic tissue and portions of the bone should be removed when symptoms and appearances indicate pressure, altered secretions, interference with drainage, and the normal functions of the nose.
7. Escharotics should never be employed.
8. The galvanic cautery is of doubtful efficiency.
9. A clean cut by means of specially devised scissors through both soft tissue and bone is by far the best method for operation.
10. The snare offers the best method for the removal of posterior hypertrophies.
11. The resultant wound should be protected by a thin layer of gauze, moistened with a 12 per cent. solution of acetotartrate of aluminum, to which may be added a few drops of weak adrenalin solution.

RHINOSCLEROMA.

BY MAX TOEPLITZ, M.D.,

AND

HENRY KREUDER, M.D.,
OF NEW YORK.

RHINOSCLEROMA has been considered until recently a curiosity, since it was apparently confined to certain districts. Of late the disease seems to spread more and to lose its endemic character. At present there are about 600 cases known to exist. The principal seat is the western part of Poland, particularly Galicia, whence it extends toward Southwestern Russia, Eastern Prussia, Silesia, Bohemia, Netherlands, Austria, and Moravia. It occurs sporadically in Hungary, and separately from the more infected centres in Italy. In Switzerland it is independently endemic 1000 metres above the sea. Sporadic cases have been also observed in Egypt, India, Japan, Honolulu, and Australia. Some 23 cases have been reported from Central America. A few isolated cases, mostly immigrated from Galicia, have been observed in New York: one by Dr. W. Freudenthal, another by Dr. Martin W. Ware, and two by myself, all four from Galicia, and one by Dr. A. Ripperger in a German woman from Marburg.

My two cases are as follows:

CASE I.—A Galician woman, aged twenty-five years, had noticed from the beginning of her pregnancy a tumor in the mouth, and simultaneously one in the nose, as large as at her first presentation,