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THE FOSSA OF ROSENMUELLER FROM THE RHINOLOGICAL STANDPOINT.*

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The fossa of Rosenmüller, the triangular corner of the nasopharynx situated behind the Eustachian eminence, is a region of the body with which we are all familiar. Yet I believe that I am correct in stating, that in the minds of most of us, pathological conditions in this region have always been associated with symptoms referable to the ear, with tinnitus, Eustachian catarrh, etc. Nowhere in the recent literature on the subject, have I been able to find any reference to symptoms usually associated with the diseases of the nose. A study of the anatomy and physiology of this region, however, will make it clear that the ear symptoms are very often secondary to disturbances of the functions of the nose, occasioned by pathological changes in this region.

The Eustachian eminence consists mainly of a plate of cartilage, bent like the inverted letter *U*, which projects downward and forward into the nasopharynx, for a distance of nearly one inch. The mucous membrane which covers the posterior and superior aspects of the cartilage, extends outward nearly its entire length and, at its outermost extremity, becomes attached to the base of the skull. The fossa is, therefore, nearly one inch in depth. The

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tip of the Eustachian eminence is free in the naso-pharynx and is situated at a distance of 1.8 cm., nearly three-quarters of an inch, from the posterior wall and an equal distance from the vault of the naso-pharynx. The distance between the tips of the two eminences is about 2.5 cm.

The main respiratory air-channel in the nose lies in the middle meatus, which is on a level with the tip of the Eustachian eminence. When, therefore, the main respiratory air-current reaches the naso-pharynx, it is divided. Part of it passes above the eminence, through the fossa of Rosenmüller and down into the pharynx; part of it passes in front of the eminence, over the soft palate; and the remainder passes into the space between the two eminences. The air-current also changes its direction when it reaches the naso-pharynx, from horizontal, to a downward direction. It is evident, therefore, that any obstruction in the fossa of Rosenmüller, or in the space between them, will interfere seriously with the smooth passage of air from the nose into the throat.

I need only refer to the respiratory obstruction caused by the presence of adenoid masses in the naso-pharynx. The lateral comb of the hypertrophied adenoid mass comes into contact with the tip of the Eustachian eminence and with the edge of the posterior lip. When the adenoid becomes inflamed, the edge of the lateral comb becomes adherent to the eminence. When the lymphoid tissue disappears from the adenoid mass during adolescence, these adhesions remain and bind the mucous membrane of the posterior wall and vault of the naso-pharynx to the Eustachian eminences. When the adenoid is removed during *deep* anesthesia, when the pharyngeal reflexes are absent and when there is no contraction of the pharyngeal musculature to force the adenoid mass through the ring of the adenotome, the instrument pushes aside the Eustachian eminence and, with it, the adherent lateral comb, so that these are apt to be left behind and only the central portion of the adenoid mass is removed.

These adhesions can be easily recognized in the post-nasal mirror. They appear as short, thick, dense adhesions, binding the posterior pharyngeal wall to the tip of the Eustachian eminence and to the posterior lip. Between the adhesions, round or oblong openings mark the entrance to the fossa. They are sometimes so numerous as to present a continuous surface, so that from one Eustachian orifice to the other, the mucous membrane appears to be continuous and there is no sign of the usual deep fossa of Rosenmüller.

Now, the Eustachian eminence is composed of cartilage, which is comparatively unyielding, while the mucous membrane of the posterior wall and of the vault, is only loosely attached to the underlying structures, so that it is not the Eustachian eminence but the mucous membrane, which is displaced. The mucous membrane of the posterior wall and of the vault are brought down to the level of the Eustachian eminence, a distance of nearly three-quarters of an inch. The mucous membrane is sometimes stretched between the two eminences, so that both fossae and the space between them are obstructed. The degree of obstruction caused by this condition, is fully equal to that caused by the original adenoid mass. It happens, in short, that adults complain of nasal obstruction, in whom no obstructive lesion of any kind is found in the nasal passages, or in whom such obstructive lesions as may have been present, have been satisfactorily removed by proper surgical measures. If the naso-pharynx is examined in these patients such adhesions will be found to be present in some of them, and the removal of these adhesions will relieve the obstruction. In young adults, whose tissues have not lost their elasticity, the mucous membrane recedes as soon as the adhesions are severed; and the relief of the obstruction will be immediate and prompt. In older persons, it may be necessary to prevent the reformation of these adhesions, it is desirable to make applications of silver to the cut surfaces, through the direct naso-pharyngeal speculum. Massage can be carried out with the aid of the applicator at the same time. When healing is completed, the appearance of the naso-pharynx is entirely changed. It is deeper and higher than before, and the deep recesses of the fossae of Rosenmüller are distinctly visible.

The presence of secretion in the fossa of Rosenmüller is of interest to the rhinologist as well as to the otologist. For the Eustachian eminence is a wall around the Eustachian orifice and the fossa of Rosenmüller is a gutter surrounding the wall whose combined purpose is to guide the nasal secretions away from the Eustachian orifice. But when the fossa is a deep one, the secretions do not readily escape from it into the lower pharynx. The reason for this will become evident upon consideration of the anatomy of this region.

The pharyngeal wall is composed of three layers—mucous membrane, aponeurosis and constrictor muscle. The upper fibres of the superior constrictor arise from the lower half of the posterior border of the internal pterygoid plate; sometimes accessory bundles

arise from the upper part of the pterygoid plate, and even from the base of the skull, at the anterior margin of the middle lacerated foramen. These fibres descend to the level of the tip of the Eustachian eminence, and curving around underneath it, ascend again, and, together with similar fibres from the opposite muscle, are inserted into the basilar process of the occipital bone, near the median line. Above and to the outer side of these fibres, the pharyngeal aponeurosis is not supported by muscle fibres. The aponeurosis, however, extends outward for a considerable distance; in fact, as far as the quadrangular plate of bone which arches over the canal for the carotid artery. The triangular area which is thus left free of muscle fibres is known as the sinus of Morgagni, and corresponds exactly to the space within the naso-pharynx which we call the fossa of Rosenmüller.

Anteriorly the fossa is limited by the salpingo-nasal fold, a fold of mucous membrane which extends upwards from the tubal eminence to the vault. It contains the accessory bundle of muscle fibres belonging to the origin of the superior constrictor, when these are present. This fold does not extend as far inward as the tip of the eminence, and so cannot always be seen by means of reflecting instruments. It can be seen through the direct speculum. It is sometimes so thick that it limits considerably the extent of the fossa of Rosenmüller in the anterior direction, and shuts it off from communication with the posterior nares. When this fold is well developed, the fossa has the shape of a narrow, tubular cavity.

Inferiorly, when the pharynx is at rest, the fossa opens directly into the groove between the posterior lip of the tube and the posterior pharyngeal wall.

During the acts of swallowing, gagging and gargling, the muscles of the pharynx contract, causing the contents of the naso-pharynx to be expressed into the oropharynx, and to appear below the soft palate. When the secretion is a thick and viscid mucus, which does not readily obey the forces of gravity or capillary attraction, this active contraction is necessary to secure drainage. This aid to drainage does not apply, however, to the fossa of Rosenmüller; for the fossa of Rosenmüller is the only part of the naso-pharynx which is not supported by muscular fibres, so that muscular contraction cannot empty the fossa. On the contrary, when the superior constrictor contracts, its upper fibres, which, as described above, form a sling around the tubal eminence, draw the mucous membrane of the posterior wall against the tubal eminence, and close the fossa. When the beak of the direct speculum holds the

tubal eminence forward, the contraction of the muscle causes the formation of an oblique ridge of mucous membrane on the posterior pharyngeal wall. The contraction of the salpingo-pharyngeus helps the superior constrictor in closing the fossa below, while the accessory bundles of the constrictor move the salpingo-nasal fold backwards, so that the entrance of the fossa becomes puckered up into a round or oval opening about a quarter of an inch in length. Thus the fossa of Rosenmüller may sometimes become effectually closed up during the contraction of the pharyngeal muscles, and its secretions actively dammed back. If a probe be passed through the opening, it will enter for a distance of nearly an inch, and the fossa, instead of being merely a corner of the naso-pharynx, becomes converted into a large, wide cavity, having the characteristics of an accessory cavity of the naso-pharynx.

The presence of secretion in the fossa of Rosenmüller, is always suggestive of nasal sinus disease. When the secretion is purulent, it is easily seen. But when it consists of strings of clear viscid mucus, pouring down over the tip of the Eustachian eminence in front of the salpingo-nasal fold, it indicates the presence of a catarrhal inflammation of one of the posterior group of accessory sinuses; and, in my experience, it is sufficiently characteristic to warrant operative interference. When the secretion is present behind the salpingo-nasal fold, it cannot be regarded as having the same significance. This is particularly true if there are adhesions present between the posterior lip and the posterior pharyngeal wall, and it is to this class of cases that I wish particularly to call attention.

The presence of these adhesions converts the lower part of the fossa of Rosenmüller into a pocket, in which secretion can accumulate. As the pocket becomes filled up, the secretion overflows and pours down the posterior pharyngeal wall. It occasionally decomposes and gives rise to a foul taste and a foul odor. As the secretion may be forced into the nasal cavity during the act of blowing the nose, all the classical symptoms of chronic sinus disease are reproduced. Yet when the adhesions are cut and the drainage of the fossa restored, all the symptoms disappear. In this connection I may also mention the case of a woman who had complained for a long time of a foul smelling breath and a bad taste. Sinus disease had been eliminated by all the rhinologists who had seen her, and the diagnosis of parosmia of nervous origin was made. When the adhesions which closed the fossae on both sides were severed, a small quantity of secretion was evacuated,

whose foul odor was distinctly perceptible. The so-called parosmia was permanently relieved.

The presence of these adhesions converts the fossa of Rosenmüller into a sort of cavity and the symptomatology of such a condition would not be complete without mentioning the possibilities of general systemic infection resulting therefrom. However, the pockets are rarely so completely closed, that the secretion is under pressure and absorption is, therefore, not the rule. Recently, however, I saw a patient who for years has been suffering from chronic rheumatism. Every possible source of focal infection had been carefully eliminated. On one side the fossa of Rosenmüller was completely closed by adhesions, behind which a thick, glairy mucus had accumulated. A culture, made from the tissues removed in cutting these adhesions, showed the presence of the streptococcus viridans in pure culture. The case is of too recent date, however, to be regarded as a proven case of focal infection.

The interior of the fossa of Rosenmüller is not very sensitive to manipulation, but the Eustachian eminence, itself, seems to be well supplied with sensory nerves. Nevertheless, it was somewhat of a surprise to me, to meet with a case in which a reflex cough had its origin in this region. The case was that of a young lady who stated that about five years previously, her adenoids had been removed because of nasal obstruction. She declared that the obstruction was not completely relieved by the operation and that ever since that time she had been suffering from a dry hacking cough without expectoration. She had been treated by numerous specialists during this time, including myself, without relief. When the adhesions which bound the posterior wall of the naso-pharynx to the posterior lip of both tubes were cut, not only was the breathing improved but the cough ceased at once. Perhaps this case is unique, but the thought occurs that if one kind of reflex neurosis may have its origin in this region, it is not impossible that other cases may be found in which nasal or laryngeal reflex neuroses originate in the same place.

It is without doubt true that not all persons in whom pathological changes in the fossa of Rosenmüller are found, necessarily suffer from all or even from any of the above group of symptoms. But the fact that there are patients who complain of rhinological or laryngological symptoms without ear symptoms, in whom the only pathological lesions that can be found are those in the fossa of

Rosenmüller, who can not be relieved until the drainage of the fossa is restored, is the burden of this communication.

To conclude, then, diseased conditions of the fossa of Rosenmüller may give rise to:

1st. A degree of nasal obstruction equally as great as that caused by hypertrophied adenoids; and persistent nasal obstruction after the removal of large masses of adenoids may be explained thereby.

2nd. Secretion pouring over the tip of the Eustachian eminence, when in front of the salpingo-nasal fold is indicative of disease in the posterior group of nasal accessory sinuses. Secretion in the fossa of Rosenmüller behind the salpingo-nasal fold, particularly when associated with adhesions in this region, may cause a clinical picture closely resembling disease of the accessory sinuses even though the latter are entirely free from pathological changes.

3rd. It is not impossible that a fossa whose drainage is obstructed may be the focus of a general systemic infection.

4th. Reflex nasal and laryngeal neuroses may have their origin in this region.

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Throat Lesions in Leprosy. J. A. HONEIJ, *New Orleans Med. and Surg. Jour.*, July, 1917.

The oral cavity is early affected. In none of the cases, even in those with signs barely diagnostic of leprosy, has the palate failed to show some inflammation and ulceration, usually situated on the sides of the raphe line, close to the uvula. In some of the healed cases there has been total destruction of the pillars and contiguous structures, giving a smooth, cave-like appearance to the throat. The tongue in some cases showed marked hypertrophy of the raphe and papillae, with an increased depression of the groove. There is little, if any, change in the gums or teeth.

The laryngeal structures (cartilage, mucous and submucous tissues) are attacked in most cases. Of three cases coming to autopsy, the trachea was attacked in two cases in its upper third. The lungs were not affected in either of the three cases.

Inflammation and destruction of the tissues of the nose is well known. Loss of smell occurred in only one case. Ed.