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OTITIS MEDIA WITH EFFUSION, EUSTACHIAN TUBE AND SOFT PALATE

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The importance of otitis media with effusion is growing constantly for its high incidence, for the complaints it causes and the sequelae it determines and for the high cost levels for medical care that it requires. Despite the multiple international research efforts, otitis media is going on to excite the interest of specialists, since neither its etiopathogeny has been clarified, nor its elective, efficient and secure treatment has been elaborated yet.

Trying to clarify some problems of this still enigmatic disease, starting from the statements of Politzer, Zöllner and others, which are already classical, three decades ago we began clinical and experimental research. Here we want to present some observations formulated during our investigations.

The human pharyngo-tympanic tube is permanently closed due to the form and elasticity of its cartilage, helped by the neighbouring tissue tension, too. The closed tube has a great importance in man, since by its phono-istoloric action it ensures perfect hearing during phonation as well. Social life would be rendered with much more difficulty if man did not hear while speaking.

As known, the openings of the Eustachian tube that are indispensable for a perfect functioning of the ear are executed by the velar muscles. But, it must be underlined, that this musculature acts primarily upon the soft palate to fulfil its physiologic functions during respiration, deglutition, phonation etc., and only partly and secondarily upon the tube.

A special importance deserves our observation that the tube function is not realized by all the velar motions or actions. Some velar functions or positions ensue a tubal insufficiency in many cases, even though the tube and velar muscles are perfectly normal.

The most important tubal function is the ventilation of the pneumatic middle ear cavities, known as "equipressive" function. This is an incorrect term, as the tubal openings do not determine the equalization of the intratympanic air pressure with the external, atmospheric one. In these cases there does not exist a mere opening of the tube, but the tube

performs by the action of the levator and tensor muscles of the soft palate a peristaltic movement through which it introduces under pressure, air in the tympanic cavity. As a result, before deglutition (i.e. before the opening of the tube) the intratympanic air pressure is generally inferior to the external atmospheric one, but after deglutition it becomes higher than the external pressure.

Because of this (and other reasons) it seems more accurate to speak of a "pumping" function of the tube.

The alternative intratympanic pressure changes, achieved by the pumping function of the tube, seem to be physiologically indispensable. They perform the pneumo-massage of the tympanic membrane and of the ossicular chain, maintaining their optimal functional elasticity and mobility, but exciting at the same time the pneumatisation of the mastoid cells, too.

From the epipharynx the tube pumps constantly into the tympanic cavity, filtered, warmed and moistened air, ready to be resorbed by the tympanic mucosa, thus also contributing to a better oxygenation of the internal ear, (through the round window).

Taking into consideration those mentioned above, it is not difficult to understand why the physiologic function of the tube cannot be replaced by a simple tympanic perforation (obtained spontaneously or therapeutically).

We should like to underline that the tube plays a decisive role, not only in the physiology of the middle ear, its dysfunction representing the cause of the big majority of otitis media, both with effusion and suppurative ones and also constituting the most frequent pathway for middle ear infections.

There is a general conception according to which the Eustachian tube opens during deglutition and yawning. Consequently, it is only deglutition that ensures the ventilation of the middle ear cavities, (far too less is yawned to be significantly involving).

On analysing this classical outlook that is generally accepted today, we must conclude that it cannot correspond to reality, first of all because all those with otitis media (or tubal dysfunctions) do not swallow less frequent and neither more deficiently than those with normal ear. Therefore, we must assume that besides deglutition there must exist another mechanism which promotes the permeabilization of the tube and which ensures its enumerated physiological functions. On the basis of those above it even seems that this supposed and still unidentified mechanism plays a more important role than deglutition. On a close examination of this problem we came to the following conclusions:

The presence of tubal dysfunction may be easily understood in the case of its organic obstructions (of an inflammatory, tumoral or traumatic origin) and in the case of the lesions that inactivate the soft palate (as nervous paralyses, cleft palate, post-traumatic and post-inflammatory scars), as well as in the case of acute rhinitis, when the tube is blocked owing to the tumefaction of the mucous membrane by which it is lined.

But there exists another group too, with mainly otitis media patients, in which this affection occurs without any pathologic modification of neither the tube, nor the velar muscles. Therefore, the question arises spontaneously which is the cause in these cases (of a big number) that the deglutitions can no longer ensure the tubal opening and middle ear ventilation.

On examining the patients of this second group, namely those with otitis media which has appeared during nasal tamponades, obstructed malformations of the nose, septum deviations, concha hypertrophies, nasal polyposis, foreign bodies, as well as benignant and partly malignant nasal tumors, we come to the conclusion, that these affections are not dependent directly on the soft palate or the Eustachian tube and that all of them generate a single common modification, that of oral respiration.

Having carefully examined the patients with otitis media for many years, we found that most of them were breathing mainly through the mouth (and that in most of them, this pathologic and pathogenic respiration was present frequently without any identifiable objective causes, i.e. as a result of a mere bad habit).

On this account we came to the conclusion that it is not nasal obstruction but probably constant oral respiration responsible for the dysfunction of the tube, i.e. of the tubal insufficiency.

Consequently, we initiated some studies regarding the soft palate function in respiration. In these studies we carefully examined the anatomic structure of the soft palate, recording several observations from which we mention the following:

Besides the levator and tensor muscles of the soft palate, the palatoglossal muscles, which have been totally neglected so far, act decisively in the opening of the tube.

The position of the soft palate determines the type of respiration, whether it will be transoral or transnasal (i.e. it will be not determined only through the opening or closing of the mouth. We can also breathe freely through the nose with a wide open mouth).

In nasal respiration the palatoglossal muscle draws down (verticalizes) the soft palate, fixing it to the base of the tongue. Thus, the bucco-pharyngeal isthmus will be closed and the inspired air passes through the nasal fossas and the cavum to the meso- and hypopharynx. In this case, beside the fact, that the air inspired through the nose dries the superior respiratory tract, causing the evaporation of the nasal secretions, the epi-mesopharyngeal passage opens widely and ensures the large drainage of the secretions that might have remained in the nasal fossas and the cavum (the latter being bottomless in this case).

During oral respiration, the palatoglossal muscle relaxes and the contraction of the levator and tensor muscles of the soft palate lifts the palate (horizontalizes it). The soft palate thus closes the epi-mesopharyngeal passage, stopping the nasal fluid drainage to the mesopharynx. The bucco-pharyngeal isthmus opens and the inspired air enters the hypopharynx through the oral cavity and the mesopharynx. During oral respiration, the horizontalized soft palate (the bottom of the cavum ap-

pears) forms together with the base of the nasal fossas a naso-epipharyngeal-trough, in which the nasal secretions, meant to moisten the inspired air, are accumulated and stagnated. The level of these secretions grows relatively fast, covering already after 15—20 minutes the pharyngeal ostium of the tube. In these cases, the tube can no longer pump the air into the middle ear but only the existing secretions, which are accumulated in the cavum. Thus can be explained the way in which some (effusion, gluey, septic etc., physiologically uncommon) secretions get into the tympanic cavity. According to the bacterial content of these stagnating nasal secretions otitis media with effusion or suppurative otitis will appear.

In conclusion, nasal respiration facilitates the drying of the nasal fossas, of the paranasal sinuses and of the cavum by evaporation and optimal drainage of the secretions. On the other hand, oral respiration leads to nasal fluid accumulation and stagnation, both in the nasal fossas and in the paranasal sinuses and epipharynx, by suspending their evaporation and drainage.

The soft palate raising (horizontalization) is the result of the contraction of the levator and tensor palatini muscles. It is generally believed, that simultaneously with the palate raising, these muscles open the tube, too. According to our observations, the contraction of these muscles lifts the soft palate only when the palatoglossal muscles are relaxing, but in this case they do not open the tube. During nasal respiration, i.e., when the soft palate is verticalized and fixed to the base of the tongue, the levator and tensor muscle contraction can no longer lift the palate, but it opens the tube instead. In conclusion, the levator and tensor muscles either raise the palate or open the tube, but they cannot perform both functions at the same time. The result of their contraction is conditioned by the contraction or relaxation of the palatoglossal muscles.

The conclusion of those above is that nasal respiration promotes the tubal function, while oral respiration impedes it. This state has a special importance not only for the clarification of the ethiopathogeny of otitis media but also because it opens the way to a prophylaxis and an elective, efficient and secure therapy for the control of this mass disease.

Confirming the decisive role of respiration in the regulation of the tubal function, we asked the question which is the relation between the type of respiration and deglutition. Our investigations proved, that it is not deglutition but nasal respiration that mainly animates the tubal function. The deglutitions open undoubtedly the tube, but these obvious openings occur seldom enough.

As in the case of each muscle and articulation, where there are possible more or less ample contractions and movements, in the case of tensor muscle contraction of the soft palate, too, there can be produced large evident openings (as generally during deglutitions), but also more reduced, limited and less ample ones. In the latter case the pharyngeal orifice of the tube closes before the opening of its lateral (tympanic) orifice, but it introduces air into the tympanic cavity in this case, too. These latent openings appear during deep inspirations through the nose. Consequently, in the periods between deglutitions, nasal respiration ensu-

res the middle ear ventilation by means of latent openings (latent peristaltic movements). If nasal respiration is interrupted, i.e. in the periods of oral respiration (e.g. while smoking, when swimming etc.), the openings obtained through deglutition are frequently insufficient and as a result of the so appeared tubal dysfunction, otitis media will occur. The fact that the otitis with effusion does not appear in all the transoral respirations, denotes that the deglutitions may ensure themselves the tubal openings in some cases.

Therefore, among the prophylactic and therapeutical measures to prevent and cure otitis media, a special and well-deserved place should be reserved for the education to a persistent nasal respiration and the re-education of the patients to a constant nasal respiration, respectively.

References

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