

REPORT CARD 2023

# EUSTACHIAN TUBE DYSFUNCTION

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This month's bulletin presents a topic that has often been neglected in audiology, that is, Eustachian tube dysfunction. In

the following, we outline some of the important features of the Eustachian tube.

## WHAT IS THE EUSTACHIAN TUBE?



**The Eustachian tube (ET) is a muscular canal that connects the middle ear (ME) with the back of the throat, the nasopharynx.**

**The structure is important for the functioning of the auditory system, allowing pressure equalization and aeration of the ME, drainage of secretions, and protecting the ME from damage.**

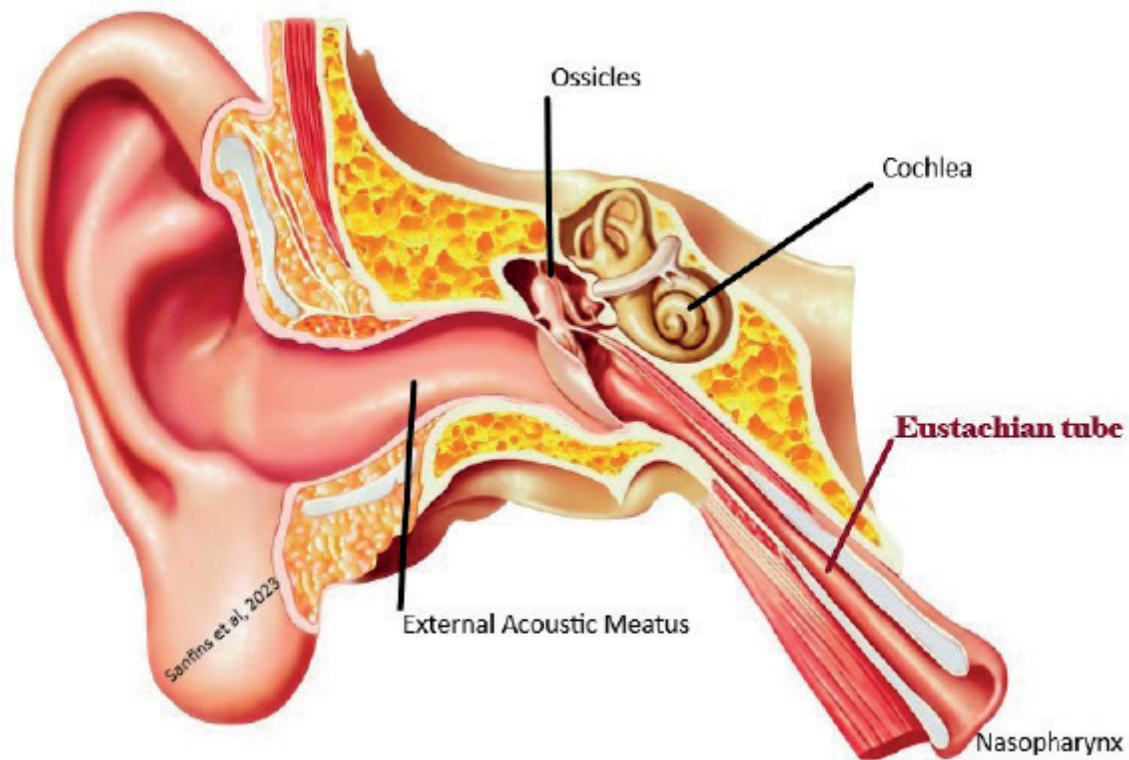
Bartolomeo Eustachio was one of earliest investigators of this structure, which is why it is called the Eustachian tube, a tribute to his work. The ET has two different portions: bony and cartilaginous.

The bony portion occupies one-third of the tube proximal to the ME, and is composed of a cuboidal respiratory epithelium with a lower concentration of cilia. It remains open most of

the time. The cartilaginous portion, in turn, is found in the portion distal to the ME, closer to the opening to the nasopharynx.

It has a pseudostratified columnar respiratory epithelium, which gives the portion greater thickness. Most of the time it is closed.

Figure 1: Location of the Eustachian tube.  
Image from the authors' collection



In terms of how the Eustachian tube operates, the greatest activity comes from the cartilaginous portion, where some of the muscles responsible for its opening and closing – the so-called peritubal muscles – insert.

The group of peritubal muscles comprise the tensor veli

palatini, levator veli palatini, and salpingopharyngeus muscles. Each of them is important for the proper functioning of the ET.

Although still under study, it is known that the ET works in a specific way, constantly opening and closing in response to triggers, such as:

- **YAWNING,**
- **SWALLOWING,**
- **BREATHING,**
- **NERVOUS SYSTEM ACTION.**



## WHAT IS EUSTACHIAN TUBE DYSFUNCTION?

**When the operation of the Eustachian tube is compromised, it is a pathological condition called dysfunction of the Eustachian tube.**

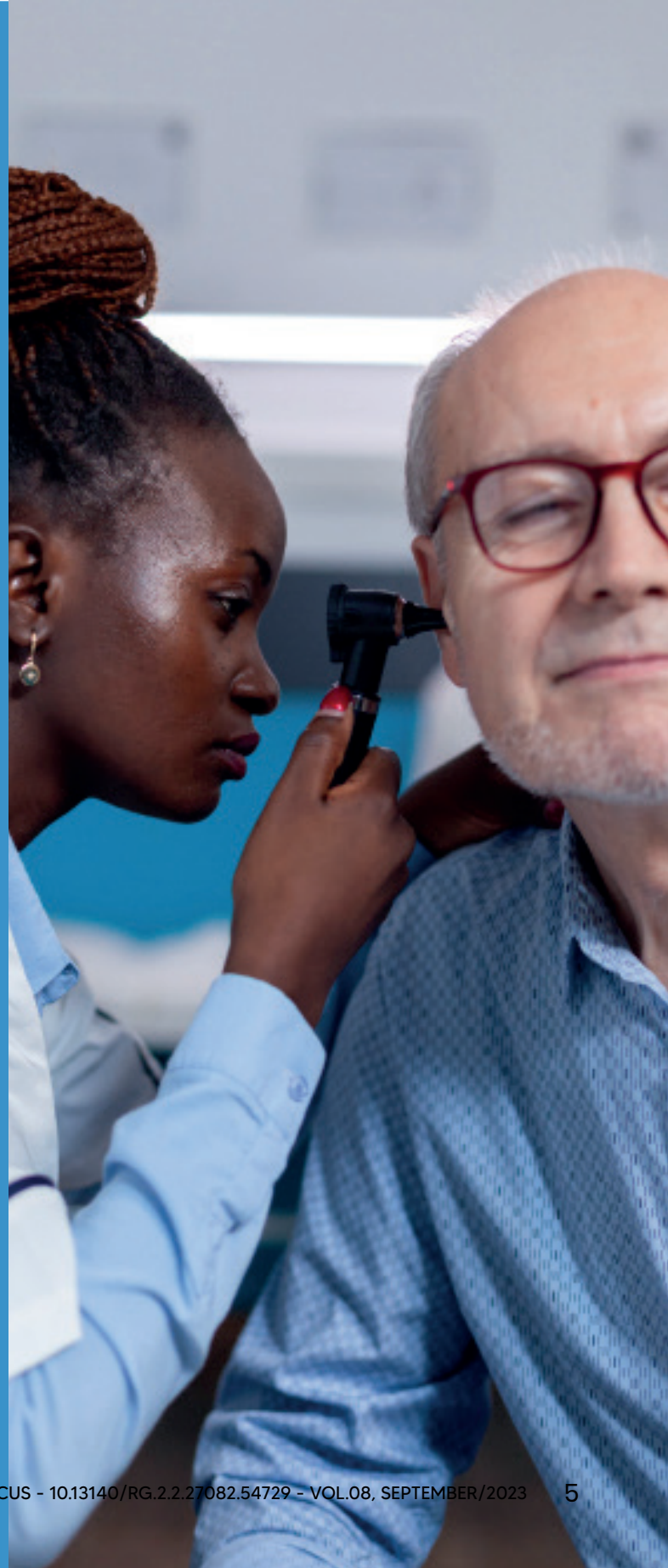
In 2015, a group of specialists met to develop a consensus on definitions, diagnostic criteria, and treatment in cases of Eustachian tube dysfunction. In

this consensus, dysfunction can be divided into three different types: obstructive dysfunction, patent dysfunction, and pressure change dysfunction.

# WHAT ARE THE TYPES OF TUBAL DYSFUNCTION?

## 1. Obstructive dysfunction of the Eustachian tube:

This is the most common clinical condition, where the dysfunction causes the structure not to open effectively. The cause of the obstruction may vary from tumors in the rhinopharynx region to an inflammatory process arising from rhinopathies. Obstructive dysfunction can lead to the feeling of ear fullness and tinnitus, as well as having a pre-disposition to develop infection in the middle ear.



## 2. Patent Eustachian tube dysfunction:

In this type of dysfunction, the Eustachian tube remains open and has problems closing. Patent dysfunction of the Eustachian tube is usually associated with rapid loss of body weight, for example during a protracted hospital stay or in bariatric subjects. The most common symptom is autophony, where the voice sounds hollow.



## 3. Dysfunction of the Eustachian tube due to changes in pressure:

This condition is associated with subjects exposed to changes in pressure in their work, such as aviation workers or divers.

So far, there is no gold standard for the diagnosis of Eustachian tube dysfunction., It is therefore recommended that otorhinolaryngologists and speech therapists are involved in investigating the symptoms, and the following steps are important:

- **Otorhinolaryngological evaluation**
- **Audiological evaluation**
- **Otoscopy**
- **Investigation of the integrity of the nasal cavity and the pharyngeal ostium of the Eustachian tube**
- **Manometric tests of the Eustachian tube (tympanometry and the tubal function test).**

In tympanometry, it is common to observe a type C

tympanometric curve, indicating a negative pressure in the middle ear cavity due to obstruction of the structure.

However, more recent studies have shown that a type A curve can also be present in subjects with Eustachian tube dysfunction, indicating that tympanometry should not be used in isolation. Thus, a Tubal Function Test should be the procedure of choice associated with immittance testing.

Figure 2: Type A tympanometric curve. Equipment: Audiosmart, Neurosoft. Image from the authors' collection

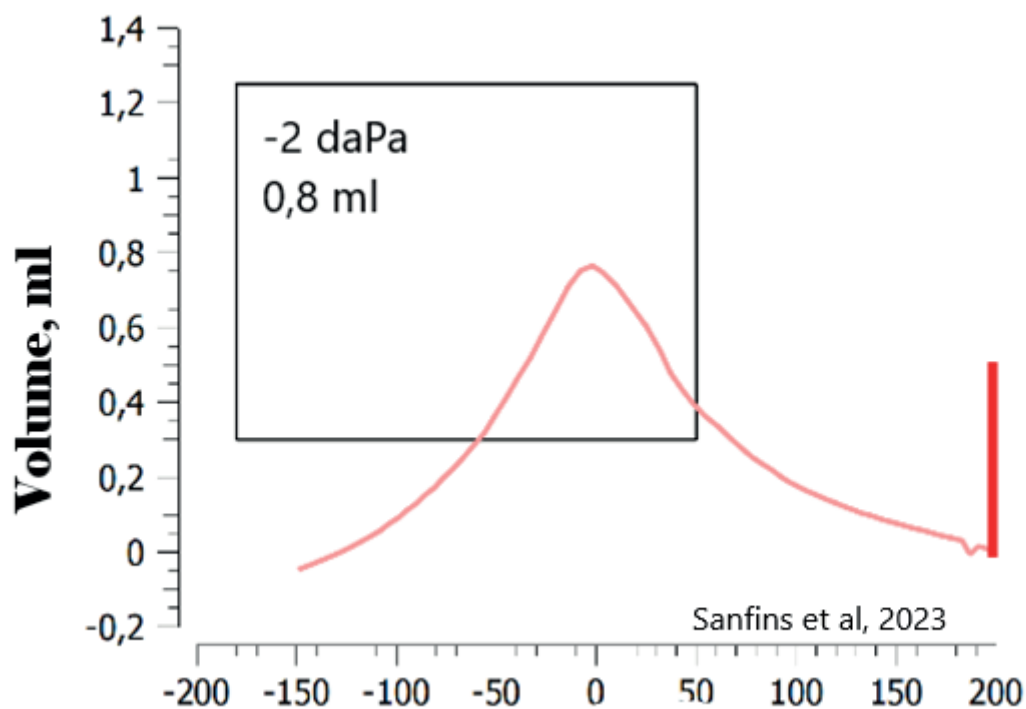
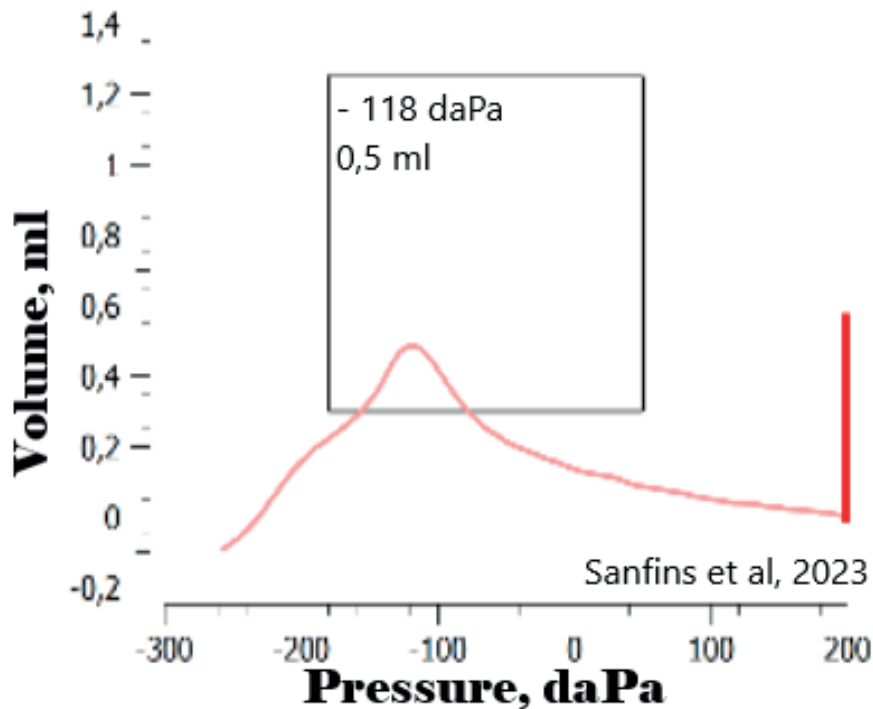


Figure 3: Type C tympanometric curve. Equipment: Audiosmart, Neurosoft. Image from the authors' collection



The tubal function test consists of different pressure measurements in the middle ear after certain maneuvers, such as swallowing or a Valsalva

maneuver (figure 4). Although the test is common, there are still some questions to be clarified, such as:

**1. what is the best maneuver to use;**

**2. which pressure change indicates Eustachian tube patency.**



Figure 4: Valsalva maneuver.  
Image from the authors' collection

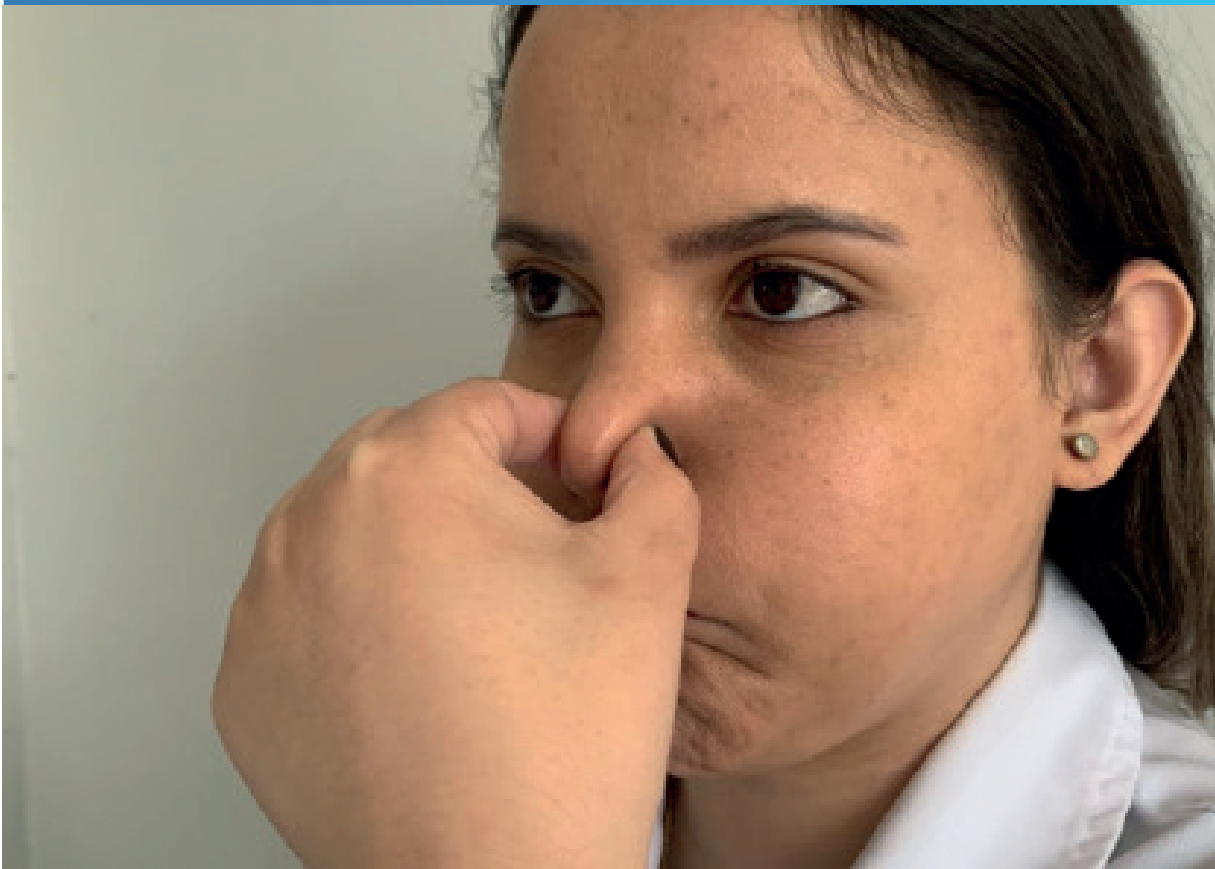


Figure 5: Normal tubal function test. Audiosmart equipment, Neurosoft. Image from the authors' collection.

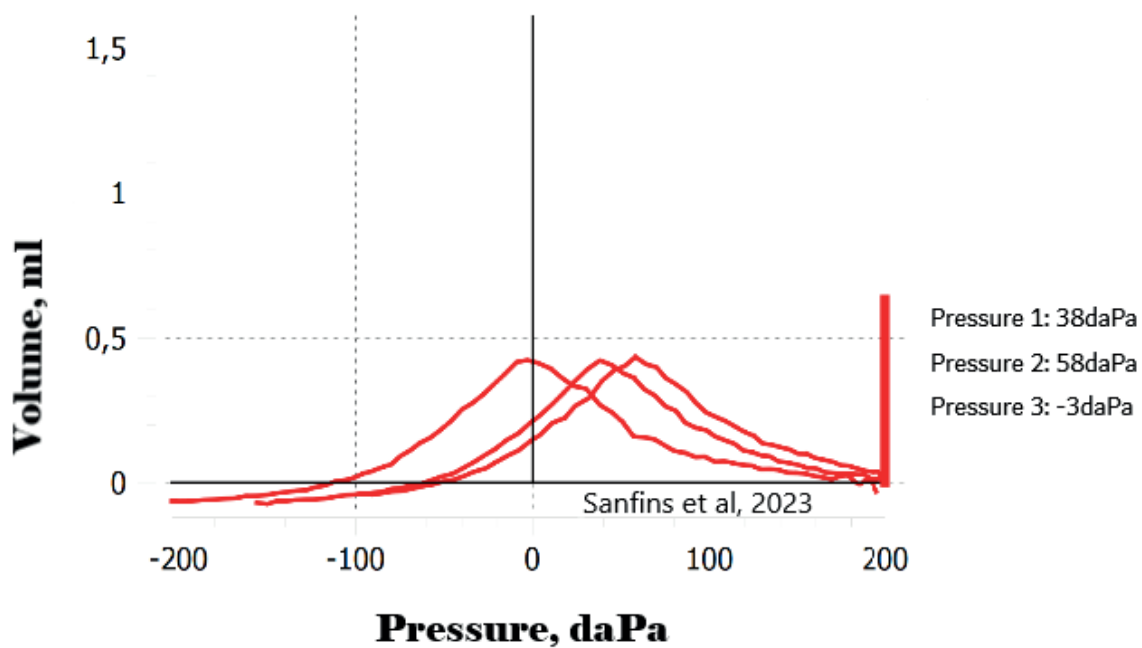
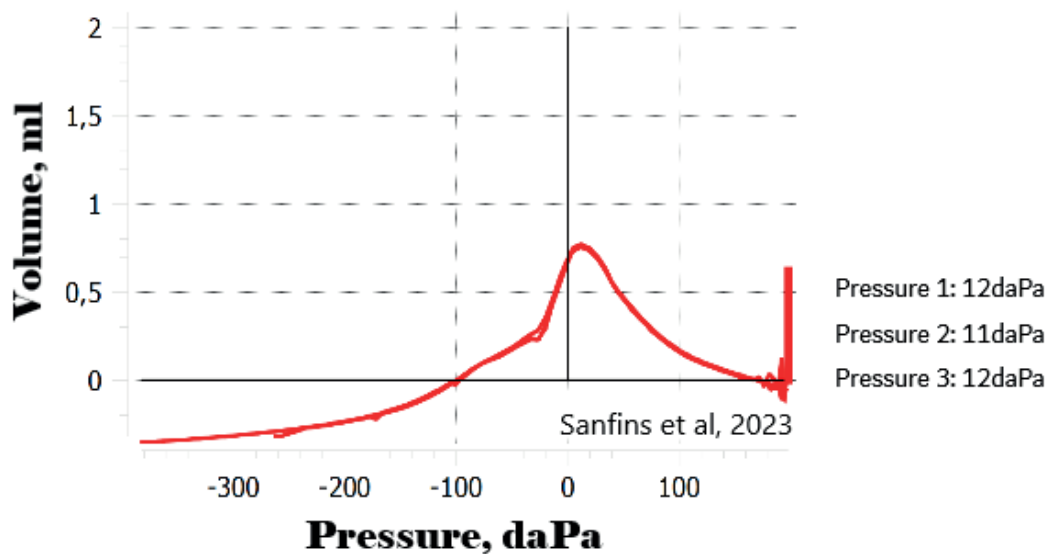


Figure 6: Altered tubal function test. Audiosmart equipment, Neurosoft. Image from the authors' collection.



With regard to the treatment of Eustachian tube dysfunction, one needs to think about the appropriate management of the cause, as well as the development of mobility of the structure.

In many cases, treatment already provides improvement in the tubal dynamics and relief of symptoms; however, when this fails to occur, it is necessary to intervene directly in the musculature. In some of these cases, it is possible to perform

peritubal muscle training, reestablishing the function of the Eustachian tube. In cases of obstruction, recent studies have demonstrated the effectiveness of applying a dilatory balloon.

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# References Consulted:

1. ADIL, E.; POE, D. What is the full range of medical and surgical treatments available for patients with Eustachian tube dysfunction? *Current Opinion in Otolaryngology & Head and Neck Surgery*. v.22, p.8-15, 2014.
2. ARS, B; DIRCKX, J. Eustachian Tube Function. *Otolaryngologic Clinics of North America*. v.49, p.1121-1133, 2016.
3. CANALI, I. et al. Assessment of Eustachian tube function in patients with tympanic membrane retraction and in normal subjects. *Brazilian Journal of Otorhinolaryngology*. v.83, p. 50-58, 2017.
4. GALLARDO, F.P. et al. Translation, validation and cultural adaptation of "The Eustachian Tube Dysfunction Questionnaire-7" (ETDQ-7) to Brazilian Portuguese (BR). *Brazilian Journal of Otorhinolaryngology*. v.85, p.456-464, 2019.
5. HURST, D.S.; DENNE, C.M. The Relation of Allergy to Eustachian Tube Dysfunction and the Subsequent Need for Insertion of Pressure Equalization Tubes. *Ear, Nose & Throat Journal*. v.99, p.39s-47s, 2020.
6. JUSZCZAK, H. et al. Sinonasal risk factors for eustachian tube dysfunction: Cross-sectional findings from NHANES 2011-2012. *International Forum of Allergy & Rhinology*. v.9, p. 466-472, 2019.
7. KIVEKÄS, I.; POE, D.S. The Eustachian Tube. PENSACK, M.L.; CHOO, D.I. *Clinical Otology*. 4<sup>a</sup> edição. p.45-55, 2015.
8. MARONE, S.A.M.; BOGAR, P. Disfunções da Tuba Auditiva. Associação Brasileira de Otorrinolaringologia e Cirurgia Cérvico-Facial. *Tratado de Otorrinolaringologia [Versão Online]*. 3<sup>a</sup> edição. São Paulo: Elsevier, p. 695-719.
9. MEHTA, N.K. et al. Medical Management for Eustachian Tube Dysfunction in Adults: A Systematic Review and Meta-Analysis. *The Laryngoscope*. v. 132, p.849-856, 2021.
10. MEYER, T.A. et al. A Randomized Controlled Trial of Balloon Dilation as a Treatment for Persistent Eustachian Tube Dysfunction With 1-Year Follow-Up. *Otology & Neurotology*. v.39, p. 894-902, 2018.
11. PARSEL, S.M. et al. Interpretation of Normal and

Abnormal Tympanogram Findings in Eustachian Tube Dysfunction. *Otolaryngology–Head and Neck Surgery*. v. 164, p. 1272-1279, 2021.

12. SCHILDER, A.T.M. et al. Eustachian tube dysfunction: consensus statement on definition, types, clinical presentation and diagnosis. *Clinical Otolaryngology*. v.40, p. 407–411, 2015.

13. SCHUON, R. et al. Functional aspects of the Eustachian tube by means of 3D- modeling. *Plos One*. v.16, p. e0244909, 2021.

14. SMITH, M.E. et al. Eustachian tube dysfunction: A diagnostic accuracy study and proposed diagnostic pathway. *Plos One*. v.13,

p. e0206946, 2018.

15. SPERANCINI, C.L. et al. A eficácia de exercícios para disfunção da tuba auditiva. *Revista da Sociedade Brasileira de Fonoaudiologia*. v. 12, p. 34-40, 2007.

16. TYSOME, J.R.; SUDHOFF, H. The Role of the Eustachian Tube in Middle Ear Disease. *Advances in Oto-Rhino-Laryngology*. v. 81, p. 146-152, 2018.

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