

# Vertigo: Eustachian tube function should be tested before vestibular function

## Keywords

alternobaric vertigo, Eustachian tube dysfunction, vertigo

**Abbreviations:** ETD, Eustachian tube dysfunction; ABV, alternobaric vertigo

## Editorial

The 2015 Eustachian Tube Dysfunction (ETD) Consensus Statement provides the definition, types, clinical presentation, and diagnosis of Eustachian tube disorders. ETD is defined by the consensus statement as a syndrome with a group of signs and symptoms which indicate dysfunction of the Eustachian tube. In clinical practice, ETD is defined by symptoms and signs of pressure dysregulation, often associated with ventilatory dysfunction, in the middle ear. To be diagnosed with the condition, the patient must present with pressure disequilibrium, specifically symptoms of 'aural fullness' or 'popping' sensation and discomfort/pain in the affected ear. Patients may also report pressure, a clogged or 'under water' sensation, crackling, ringing, autophony, or muffled hearing.<sup>1</sup>

Vertigo was left off the consensus statement, but it has long been associated with ETD. Obstruction of the Eustachian tube disturbs the air pressure in the middle ear, which stimulates the perilymph, and interferes with normal balance which is maintained by the labyrinthine mechanism. Vertigo caused by obstruction of the Eustachian tubes is a distinct clinical entity and patients with vertigo often unnecessarily suffer symptoms of vertigo, nausea, and vomiting, sometimes for long periods, because their physicians fail to recognize the cause.<sup>2</sup> In the consensus statement, 'baro-challenge-induced Eustachian tube dysfunction' is mentioned as a result of alteration or fluctuation in ambient pressure.<sup>1</sup> Baro-challenge-induced Eustachian tube dysfunction may be a cause of Alternobaric vertigo (ABV). ABV is a symptom of ETD. ABV results from unequal pressure between the middle ears and is usually caused by bilateral middle ear pressures changing at different rates, causing the brain to erroneously perceive the difference as movement. Similar to some symptoms of ETD, ABV may be accompanied by a feeling of fullness, tinnitus, and muffled hearing in one or both ears. In severe cases, nausea, vomiting, and nystagmus can also occur.<sup>3,4</sup>

The aim of this editorial is to highlight the distinct overlap of the symptoms of ABV and ETD. Persistent ABV at ground level is associated with abnormal vestibular function test results. Primary care physicians, emergency care physicians, neurologists, and otolaryngologists should be aware that vertigo associated with ETD is caused in most (and perhaps all) instances by unilateral Eustachian tube obstruction or by more complete obstruction one side than the other.<sup>2</sup> The vestibular organs are always influenced by middle ear pressure which makes them dependent variable organs. Obstruction of the Eustachian tube disturbs air pressure in the middle ear. Vertigo from ETD can be caused by a pressure increase that occurs within the vestibular organ. Specifically, negative pressure in the middle ear can cause the tympanic membrane to retract, which in-turn causes the stapes to push against the oval window.<sup>5</sup> It is likely that dysfunction

Volume 12 Issue 3 - 2020

**Hee Young Kim**

Department of Otolaryngology, Kim ENT Clinic, Republic of Korea

**Correspondence:** Hee Young Kim, Department of Otolaryngology, Kim ENT Clinic, 2nd fl. 119, Jangseungbaegi-ro Dongjak-gu, Seoul, 06935, Republic of Korea, Tel +82-02-855-7541, Fax +82-02-855-7542, Email kheyoun@gmail.com

**Received:** June 23, 2020 | **Published:** June 25, 2020

of the vestibular organ is caused by poorly regulated pressure in the middle ears.

In reported cases of ABV, vestibular function tests were abnormal, but Eustachian tube function tests revealed dysfunction of the tube.<sup>6</sup> A primary reasons for assessing the Eustachian tube function is the need to make a differential diagnosis in patients with intact tympanic membrane without evidence of otitis media, but with symptoms potentially related to ETD (otalgia, snapping or popping in the ear, fluctuating hearing loss, tinnitus, or vertigo).<sup>7</sup> ABV should be differentiated from any condition conferring active risk of vertigo or severe disequilibrium. This includes peripheral causes such as Menière's disease, benign paroxysmal positional vertigo, and vertebrogenic dizziness, as well as central disorder.<sup>8</sup> This strongly indicates that ETD must be ruled out before any vestibular function test.<sup>5</sup> Because persistent ABV at ground level is associated with abnormal vestibular function test results, Eustachian tube function should be tested before vestibular function. Every vestibular function test should be performed in a state where pressures in the middle ear cavities are well within normal range, and perfectly balanced between the ears.<sup>5</sup> This is because the middle ear cavity pressure caused by ETD can influence vestibular function. Thus, the test results can erroneously indicate vestibular organ dysfunction, when in fact, the vertigo symptoms stem from dysfunction of the Eustachian tube. Therefore, it is important that Eustachian tube function should be assessed before vestibular function to rule out ETD which, if present, will significantly influence vestibular function test results. Taking these points into consideration, I would like to (1) propose that ABV be included in the ETD Consensus Statement as an official symptom of ETD, (2) reiterate that Eustachian tube function should be tested before vestibular function, and (3) call for case studies and research into cases of vertigo where Eustachian tube function was assessed before vestibular function.

## Acknowledgments

The author has no acknowledgments.

## Conflicts of interest

The author declares that there is no conflict of interest to disclose.

## Funding

The author has no funding, financial relationship.

## References

1. Schilder AG, Bhutta MF, Butler CC, et al. Eustachian tube dysfunction: consensus statement on definition, types, clinical presentation and diagnosis. *Clin Otolaryngol*. 2015;40(5):407–411.
2. Merica FW. Vertigo due to obstruction of the eustachian tubes: a clinical study based on one hundred and thirty-five cases. *JAMA*. 8(15):1282–1284.
3. Kitajima N, Sugita-Kitajima A, Kitajima S. Altered Eustachian tube function in scuba divers with alternobaric vertigo. *Otol Neurotol*. 2014;35(5):850–856.
4. Klingmann C, Knauth M, Praetorius M, et al. Alternobaric vertigo — really a hazard? *Otol Neurotol*. 2006;27(8):1120–1125.
5. Kim HY. Vertigo due to Eustachian Tube Dysfunction. *Archives of Otorhinolaryngology-Head & Neck Surgery*. 2017;1(1):5.
6. Bluestone CD, Swarts JD, Furman JM, et al. Case Report: Persistent Alternobaric Vertigo at Ground Level due to Chronic Toynbee phenomenon. *Laryngoscope*. 2012;122(4):868–872.
7. Bluestone CD. Eustachian tube: Structure, function, and role in Middle Ear Disease. 2nd ed. People Medical Publishing House USA: Raleigh, North Carolina; 2018.
8. Mallen JR, Roberts DS. SCUBA Medicine for Otolaryngologists: Part II. Diagnostic, Treatment, and Dive Fitness Recommendations. *Laryngoscope*. 2019;9999:1–6.