

# Eustachian tube catheterization: behind the times, or essential fundamental for competent otolaryngologists?

**Abbreviations:** ETC, eustachian tube catheterization; ETO, eustachian tube obstruction

## Editorial

### Diagnosis & treatment of mechanical obstruction of eustachian tube

'Hearing loss' and/or 'ear fullness' and/or 'dizziness (vertigo) and/or 'tinnitus' and/or 'headache (migraine)'. These are the combination of symptoms that are commonly made by otolaryngologic patients in my outpatient clinic. In this case, what is the first thing you must consider, dear reader? First of all, I firmly believe that I need to check the state of the middle ear and Eustachian tube. In my opinion, it is essential that doctors know that Eustachian Tube Catheterization (ETC) must be practiced with the proper technique in order to diagnose or rule out the obstruction of the Eustachian tube.

### Reciprocal causal relationship between laryngopharyngeal reflux and eustachian tube obstruction

Especially in cases complaining of nausea, and/or vomiting, and/or perspiration accompanied concomitantly by vertigo, which are attributable to Eustachian tube obstruction, it also seems distinct that Laryngopharyngeal reflux or Gastroesophageal reflux disease has a reciprocal causal relationship with Eustachian tube obstruction, which causes a vicious cycle.

### Eustachian tube catheterization: an introduction

Although Eustachian Tube Obstruction (ETO) as one of the principal causes of a wide and diverse variety of symptoms, has been recognized by many well-respected senior doctors for a long time, it has still received only scant attention both in the literature and in practice. Nowadays, 'Eustachian tube catheter' and 'Toynbee diagnostic tube', which are used for Eustachian tube catheterization by me in my clinic even now, are forsaken by most otolaryngologists. Otolaryngologists throw them away without considering the concept for their necessity. Furthermore, these devices are found in just the records of the history books, or are treated as just historical antiques in a museum. How sad and frightening!

My medical experiences over 20years have resulted in learning valuable opinions of excellent researchers. As a clinician who inherited Eustachian tube catheterization through an apprenticeship, and feels I should preserve it, I would like to present you this clear proposition as follows: With the view to 'ideally normalize middle ear cavity pressure with perfectly equal balance between both ears', Eustachian tube catheterization may be of both diagnostic and therapeutic value.

With the above-mentioned necessity of Eustachian tube catheterization, I would like to introduce the method with devices

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such as a 'Eustachian tube catheter' and a 'Toynbee diagnostic tube' in more detail, which is carried out in my clinic myself, although there are many ways of doing it. This procedure is more than a century old and was earlier routinely done to check patency of the Eustachian tube.

Please don't forget. Eustachian tube catheterization is the most fundamental and essential technique for a competent otolaryngologist.

### 'Eustachian tube catheter' and 'Toynbee diagnostic tube': by U.S. food and drug administration

At present, according to the Code of Federal Regulations Title 21 which was revised as of April 1, 2015 by the U.S. Food and Drug Administration, the 'auscultation tube' is labeled as 'Sec. 874.1925 Toynbee diagnostic tube', and it is identified as follows: 'The Toynbee diagnostic tube is a listening device intended to determine the degree of openness of the Eustachian tube.' Eustachian tube catheter can be found in 'Sec. 874.4175 Nasopharyngeal catheter', which is identified as follows: 'A nasopharyngeal catheter is a device consisting of a bougie of filiform catheter that is intended for use in probing or dilating the Eustachian tube. This generic type of device includes Eustachian catheters.'

### Eustachian tube catheterization: the history (Figure 1)

The tube is inserted through the nose, and the stop-cock of the air pump is turned to inject air or other solutions combined with salt, or gaseous vaporizations such as tobacco smoke, coffee fumes, or ether. Since the Eustachian tube connected the ear with the mouth, surgeons believed any blockage in the Eustachian tube severely interrupted the communication process between hearing and speech. Source: William Wilde, Practical Observations on Aural Surgery (London, 1853). In 1724, Eustachian tube catheterization was first described by Edmé Gilles Guyot (?). And then after about 125 years, Joseph

Toynbee (1815-1866) invented an 'auscultation tube', which he called an 'otoscope', in 1850.



Figure 1 Catheter & Air Press set up.

It is rather conventional to say that the history of otology is in line with the history of the concept development related to Eustachian tube catheterization. Based on the historical book 'The history of otology' (2015), literature materials from 1724 to 1861, which are related to catheterization of the Eustachian tube, are selected and arranged in this article. There can be some differences between both in terms of interpretation of the historical significance about them.

Focusing on the concept development related to Eustachian tube catheterization from 1724 to 1861, its process can be subdivided into seven sub-themes:

- i. Beginning of Eustachian tube catheterization for therapeutic reasons (1724)
- ii. Evaluation of the patency of the Eustachian tube (1825)
- iii. Recognition of normal state of the Eustachian tube as a prerequisite for normal hearing (1836)
- iv. Therapeutic test of inflation of the Eustachian tube (1836)
- v. Eustachian tube catheterization for diagnostic reasons (1838)
- vi. Eustachian tube catheterization as a first step before artificial perforation of tympanic membrane (1843)
- vii. Toynbee diagnostic tube used with Eustachian tube catheter (1861)

During this period from 1724 to 1861, the standard for instruments, technique and concept for Eustachian tube catheterization was still in its infancy. However, the progress of the concept development is, in itself, the procedure of approaching these patients for treatment at the coalface even today. It is a very precious historical asset which should be preserved forever.

About 110 years passed after Eustachian tube catheterization was first described by Edmé Gilles Guyot in 1724, until it was recognized in 1836 that a patient's Eustachian tube was a prerequisite for normal hearing through the study by Nicolas Deleau the Younger (1799-1862). Today after about 165 years have passed since then, it is the time to revive the spirit and achievements of these trailblazers in the field of Eustachian tube catheterization, and moreover, to recognize the proposition that 'ideally normal middle ear cavity pressure with perfectly equal balance between both ears' is the core prerequisite before diagnosis and treatment for any symptom and disease as well as hearing loss. Eustachian tube catheterization may be of both diagnostic and therapeutic value; these patients of Eustachian tube obstruction should be subjected to the therapeutic test of inflation of the tubes as a first step in a thorough clinical investigation.

### Eustachian tube catheterization: the future

This concept should also be with the starting point of opening up the coming 'Digital Health Age'. The history of Eustachian tube catheterization is still ongoing. Finally, I'd love to conclude this article with a quotation from a paper.

#### Dr. F.W. Merica bewailed

*"many patients suffer unnecessarily the distressing symptoms of vertigo, nausea and vomiting, sometimes for long periods, because their physicians fail to recognize the cause and to institute the simple procedure of mechanical inflation of the eustachian tubes which would bring them relief."*

(Dr. F.W. Merica, 'Vertigo Due To Obstruction Of The Eustachian Tubes' [Journal of American Medical Association, 1942]).

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