Future of EES

M Tarabichi

Dubai
I have nothing to disclose.

No, within the last 12 months I have not had any type of financial arrangement or affiliation with commercial interests related to the content of this continuing education activity that requires disclosure.
Wide postauricular access

Mastoid

Ear Canal

Wide postauricular access

Eustachian Tube
Valsalva CT
Visualization of the Eustachian Tube Lumen With Valsalva Computed Tomography

Muaaz Tarabichi, MD; Murtaza Najmi, MD

Objectives/Hypothesis: Assess the feasibility of using the Valsalva maneuver to visualize the cartilaginous eustachian tube lumen with computed tomography (CT) in subjects with no ear disease.

Study Design: Prospective case series study.

Methods: Thirty-eight consecutive patients undergoing CT of the sinuses for nose-related complaints with normal radiographic findings consented for a CT of the temporal bone while performing the Valsalva maneuver. Multiplanar reconstruction was performed along the axis of the tube. Images were assessed for visualization of the whole length of lumen of the tube, or partial visualization with ratio of visualized to nonvisualized segments.

Results: The Valsalva maneuver allowed visualization of the whole length of the tube in 27/76 (35%) ears examined. It consistently visualized the distal one-third of the cartilaginous tube in 71/76 (94%) ears. Paradoxical collapse of the eustachian tube was present in three ears along with evidence of poor Valsalva technique.

Conclusions: Valsalva CT consistently allows visualization of the lumen of the distal one-third of the eustachian tube in a majority of patients with no eustachian tube-related complaints. This technique might be helpful in localizing eustachian tube pathology in patients with obstructive tube symptoms.

Key Words: Cholesteatoma, chronic ear surgery, eustachian tube dysfunction, computed tomography, Valsalva, imaging of eustachian tube.
Upstream

VENTILATION

Downstream

MICROSCOPIC ACCESS
Aligning Access with the Disease Process:

• In terms of Ventilation: It is definitely counterintuitive physiologically to worry about mastoid.

• It’s a function of our surgical approach not disease: We usually do not fail in the mastoid.

• The mastoid is at best a temporary–transient buffering system for gas regulation.

• The Ultimate Fallacy of all : the Mastoid is the Eustachian tube twin system for ventilation.
The Eustachian Tube

It consists of two parts: the first solidly connected with the temporal bone, close to the tympanic cavity; the second soft, partly ligamentous, partly cartilaginous, directed towards the nasopharynx.

—Bartholomeus Eustachius, Epistola de Auditus Organis (Examination of the Organ of Hearing), 1562, Rome
Editorial

The Eustachian Tube Redefined

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Since its first description by Eustachius, the concept of the Eustachian tube as partly bony structure has taken deep roots in our understanding of its anatomy, function, and possible dysfunction. Microscopic and gross anatomical observations of the “bony tube” have made a distinction between “the protympanum,” a tympanic cavity structure, and a more anterior and inaccessible “bony Eustachian tube.” Endoscopic observation of that area allows a very different view of anatomy and renders this distinction arbitrary and irrelevant.

While the protympanum was once a difficult-to-access region of the middle ear, the adoption of middle-ear endoscopes and angled instrumentation has made direct viewing and access feasible. Indeed, by observing the protympanum from this perspective, it is clear that the bony Eustachian tube and the protympanum are essentially one and the same.

The Eustachian tube as viewed endoscopically does not have a bony portion. It is a fibrous/cartilaginous structure that stretches from the nasopharynx to the most anterior part of the tympanic cavity (the protympanum). Its two openings are strikingly similar cufflike protrusions into the relevant space. This new understanding allows a more clear and distinct anatomical description of an area that is increasingly accessible for surgical interventions.
The Eustachian tube as viewed endoscopically does not have a bony portion. It is a fibrous/cartilaginous structure that stretches from the nasopharynx to the most anterior part of the tympanic cavity (the protympanum). Its two openings are strikingly similar cufflike protrusions into the relevant space. This new understanding allows a more clear and distinct anatomical description of an area that is increasingly accessible for surgical interventions.
Protympanic Segment of ET

• The most common Site of obstruction in chronic ears.

• Contains the Isthmus of the ET, just beyond the carotid canal.

• It is the end of ET that is closer to the recurrent middle ear infection site.
Site of Eustachian Tube Obstruction in Chronic Ear Disease

Muaaz Tarabichi, MD; Murtaza Najmi, MD

Objective: Assess the patency of the proximal and distal segments of the Eustachian tube in patients undergoing surgery for chronic ear disease.

Study Design: Case study with control group.

Methods: All consecutive patients presenting for surgery for chronic ear disease in our practice over 14 months underwent preoperative Valsalva computed tomography (CT), and an attempt was made intraoperatively using angled rigid scopes to evaluate obstruction of the protympanic segment of the Eustachian tube. Endoscopic examination of the same segment in 19 cadaver ears served as a control group.

Results: Preoperative Valsalva CT showed patency of the distal one-third of the Eustachian tube in 51 of 53 ears. Intraoperative endoscopy allowed visualization of the protympanic opening of the Eustachian tube in 31 of 53 ears; 21 of 31 ears showed obstruction of the protympanic opening of the Eustachian tube.

Conclusion: A clear obstruction was more likely to be present in the protympanic opening of the Eustachian tube in the patient population undergoing surgery for chronic ear disease than in the cadaver control group, and was equally likely to be present in the distal cartilaginous tube in patients as in the control population.

Key Words: Eustachian tube dysfunction, cholesteatoma, tympanic perforation, surgery for chronic ear disease, tympanic perforation.

Level of Evidence: 4.

INTRODUCTION

Surgery for chronic ear disease has always centered on disease removal and restoration of hearing without paying much attention to the underlying Eustachian tube pathology. Much of the Eustachian tube lies out of reach of our traditional instruments; thus, it is always assumed that time and age have resolved its pathology.\(^1\) Failures in surgery for chronic ear disease have been shown to correlate with persistent Eustachian tube dysfunction (CT) has been recently reported by our group as a method for visualizing the lumen of the distal one-third of the Eustachian tube.\(^8\) We have utilized both modalities to evaluate any identifiable anatomic obstruction in the Eustachian tube in patients undergoing ear surgery for chronic disease in our practice.

MATERIALS AND METHODS

Our study cohort consisted of 53 patients undergoing otologic surgery, 19 of whom served as controls. Preoperative Valsalva computed tomography (CT) was performed in all patients. The patency of the distal one-third of the Eustachian tube was assessed using angled rigid scopes. The same segment was then examined endoscopically in 31 of 53 ears, and the results were compared to the CT findings.

Laryngoscope, 00:000-000, 2015
Site of Eustachian Tube Obstruction in COM

• 53 consecutive chronic ears endoscopic procedures + Preoperative Valsalva CT.
• Control group of 19 cadaver ears for endoscopic findings of protympanum.
• Valsalva CT documented patency of distal 1/3rd of Eustachian tube in 51/53.
• Clear obstruction of protympanum in 21/31 COM ears as compared to consistent patency in controls.
Eustachian Tube Isthmus
Fig. 1. Valsalva computed tomography of the Eustachian tubes of a patient who presented with reperforation after an earlier right tympanostomy tube insertion.
ORIGINAL ARTICLE

Transtympanic dilatation of the eustachian tube during chronic ear surgery

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Abstract

Conclusion: Evaluation of the protympanic segment of the eustachian tube is feasible during chronic ear surgery. Balloon dilatation of that segment yields a bigger aperture. Objective: To evaluate the feasibility of visualization and balloon dilatation of the protympanic segment of the eustachian tube during chronic ear surgery. Methods: This study was carried out on a consecutive case series. All patients undergoing surgical treatment for cholesteatoma or tympanic membrane perforation over a 6-month period of time at a tertiary hospital were evaluated intraoperatively for the ability to visualize the protympanic segment of the eustachian tube, perform balloon dilatation, and then perform visual inspection of the effect of dilatation. Results: A total of 21 chronic ear procedures were performed; visualization of the protympanic segment was feasible in 12 ears, obstruction was identified in 7 ears, and dilatation was undertaken. Immediate assessment showed increased aperture of the tube in all patients when compared with predilatation findings.

Keywords: Cholesteatoma, tympanic perforation, balloon dilatation
Feasibility and Safety of Transtympanic Balloon Dilatation of Eustachian Tube

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Objective: Assess safety and feasibility of transtympanic dilatation of proximal (tympanic-end) of the cartilaginous segment of the Eustachian tube in patients undergoing surgery for chronic ear disease.

Study Design: Case series.

Setting: Tertiary care hospital.

Subject and Methods: We reviewed the charts of 40 consecutive patients undergoing chronic ear surgery in our practice with manometric evidence of obstruction who underwent attempted transtympanic dilatation of proximal (tympanic-end) segment of the Eustachian tube. A range of outcome measures were reported that included pre and postdilatation opening pressure measurement of the Eustachian tube, closure of perforation, audiometric data, and complications.

Results: Dilatation of proximal (tympanic-end) of the cartilaginous segment of the Eustachian tube was technically feasible in 37 of 40 patients (93%). Postdilatation inspection of protympanum showed increased aperture in all dilated tubes. Opening pressure of Eustachian tube declined in 36 of 37 patients (97%). Residual perforation was evident in 5 of 40 patients (12%). No facial nerve or carotid complications were observed. Two patients had severe dizziness (5%) with one patient sustaining severe cochlear loss.

Conclusion: Transtympanic dilatation increases the patency of the Eustachian tube immediately after instrumentation. No carotid complications were observed. Continuous endoscopic control is essential to avoid subluxation of stapes. Further study of this technique is warranted to identify its role, if any, in chronic ear surgery. Key Words: Carotid canal—Endoscopic ear surgery—Eustachian tube—Protympanum—Transtympanic balloon dilatation.

Preliminary results of 40 Dilatations:

- Selection: opening pressure > 50 CM H2O.
Intraoperative Pressure Measurement
Results 40 Dilatations:

• Does not seem to improve outcome in terms of closure of perforation.
• Anecdotal evidence of lasting effect.
• No carotid complications.
• 1 patient had severe dizziness and cochlear loss.
• 1 patient had severe postop dizziness but no cochlear loss.
DILATATION HAS TO BE DONE UNDER CONSTANT VISUAL CONTROL
We absolutely need to improve outcome of chronic ear surgery

Conclusion:
• Think Ventilation.
• Think about the “Isthmus”.
• Ignore (within reason) Mastoid.
• Try a different hammer.