Challenges in Developing Treatment for Eustachian Tube Disorders

Dennis S Poe, MD, PhD
Dept of Otolaryngology, Boston Children’s Hospital
Harvard Medical School, USA
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- Off-label use of devices in the Eustachian tube.
Dilation of the Eustachian Tube

- Lack of efficacy
- Complications
  - Mucosal tears w/ scarring
  - False passage
  - Carotid injuries
  - Deaths
    - Carotid ruptures, injections
    - Intracranial emphysema

Paris 1873
Osseus Eustachian Tuboplasty

Wullstein (1960) – ME approach, widen orifice

Glasscock, House (1969) – Mid Fossa approach to isthmus


No reports of long term success
Challenges to develop therapy for Eustachian tube dysfunction

- Learn surgical anatomy, causes of mortality
- Physiology & Pathophysiology
- Medical therapy – None FDA approved
- Surgical therapy
  - Intervention
  - Approach
  - Instrumentation
- Anticipated complications, avoidance, treatment
- Clinical trials

"The difficulty is not in performing the surgery, but preventing & treating the complications."

-Michael E Glasscock, III
Eustachian tube (left)
H. Kimura, Tokyo

Iwao Honjo, Kyoto

Charlie Bluestone

Isamu Sando

Drs I. Sando & H. Schuknecht
Cartilaginous ET Most Common Site of Dysfunction

- Hopf et al ('91), Chays et al ('95) – Microendoscopy of osseous ET usually patent
- Kujawski ('00), Poe et al ('00) – Endoscopic visualization of pathology in cartilaginous ET
Analysis of Eustachian Tube Function by Video Endoscopy

*Dennis S. Poe, †Ilmari Pyykkö, ‡Hannu Valtonen, and §Juha Silvola

*Department of Otolaryngology, Massachusetts Eye and Ear Infirmary, Boston, Massachusetts, U.S.A.; †Sektionen for oron-, nas- och halssjukdomar, Karolinska Institutet, Stockholm, Sweden; ‡Department of Otolaryngology, Jyväskylä Central Hospital, Jyväskylä, Finland; and §Department of Otolaryngology Río, Tromsø, Norway
Lymphoid Hyperplasia in the Torus Tubarius

N=82 ETD, 92% functional obstruction; mucosal inflammation
Eustachian Tube Valve

Mastoid

Middle Ear

Valve

Bony-cartilaginous isthmus

4mm flexible or rigid Endoscope

Closed - resting

R Normal ET

Dilated - active
L Patulous ET Repair with Insertion of Catheter
Eustachian Tuboplasty

Defect

Laser Eustachian tuboplasty, right

Merogel with sulfa & prednisolone drops in valve

KTP laser fiber
Balloon Dilation of the ET (BDET)

- 2009 Sudhoff 1st case
- FDA randomized, controlled clinical trial 2016
Illuminated Guidewire Pushing Through Bony Eustachian Tube Obstruction
Patulous ET Reconstruction with Allograft Cartilage - Posterior-medial wall
Reconstruction of Obliterated ET
The future

- Basic science of OM pathophysiology & mechanisms of therapeutic intervention
- Long term results of balloon dilation
- Slow release drug delivery (targeted Rx, nanoparticles)
  - Topical chemical permeation enhancers - Kohane
  - Transtympanic – Harris
  - Transnasal – Chandrasekhar
  - Cartilaginous ET stent – Weeks
- ET surgery in place of tubes as primary therapy
  - Pediatrics - Tisch, Sudhoff
  - MEMS & targeted nanodevices
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