THE EUSTACHIAN TUBE
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DISCLOSURES
• None
SPECIAL THANKS

• Jack Obadia, D.O
• OB/GYN, Cosmetic Surgery
• Mentor
• Colleague
• Friend

WHAT IS IT?

• The Eustachian tube, a.k.a. auditory or pharyngotympanic tube links the nasopharynx to the middle ear
• At maturity 35 mm long and 3 mm in diameter
• Named after Bartolomeo Eustachi
• From childhood to adolescence the tube’s angulation from its early horizontal position increase
### ANATOMY/STRUCTURE

- Extends from anterior wall of middle ear to lateral wall of nasopharynx
- 1/3 proximal to ear is bony, 12 mm in length
- 2/3 cartilaginous, 24 mm in length, ends at the torus tubarius in the nasopharynx
- 4 muscles and nervous innervation
  - Levator veli palatini → Vagus Nerve
  - Salpingopharyngeus → Vagus Nerve
  - Tensor tympani → Mandibular Branch of Trigeminal
  - Tensor veli palatini → Mandibular Branch of Trigeminal

### FUNCTION

- **Pressure Equalization**: normally tube is closed, opens to allow small passage of air to allow equalization between the middle ear and the atmosphere
- **Mucus Drainage**: from build up in the middle ear
TORUS TUBARIUS

Salpingo-palatine fold
Ostium pharyngeum
Fossa of Rosenmüller
Cartilage outlined shaping the torus tubarius
Salpingo-pharyngeus
Levator veli palatini
WHEN THINGS GO ASTRAY

THE HAMULUS
Eustachian tube angle as we mature….

1 set of tubes…
2nd set, think adenoidectomy, as well

UNTIL PROVEN OTHERWISE

• 72 Year Old Chinese Male with Unilateral Otitis Media………
• Fossa of Rossenmuller
NORMAL

Middle Ear Gas Pressure Relationships
Normal

<table>
<thead>
<tr>
<th>External Ear</th>
<th>Middle Ear</th>
<th>Mixed Venous Blood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water 5.7</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td>Nitrogen 596</td>
<td>627</td>
<td>574</td>
</tr>
<tr>
<td>Oxygen 158</td>
<td>39</td>
<td>41</td>
</tr>
<tr>
<td>CO₂ 0.3</td>
<td>47</td>
<td>46</td>
</tr>
<tr>
<td>TOTAL 760</td>
<td>760</td>
<td>708</td>
</tr>
</tbody>
</table>

EUSTACHIAN TUBE DYSFUNCTION

Middle Ear Gas Pressure Relationships
Obstructed Eustachian Tube

<table>
<thead>
<tr>
<th>External Ear</th>
<th>Negative Middle Ear Pressure</th>
<th>Mixed Venous Blood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water 5.7</td>
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Nasopharynx
STAY WITH ME

Middle Ear Gas Pressure Relationships
Serous Middle Ear Transudate

External Ear

Water 5.7
Nitrogen 596
Oxygen 158
CO₂ 0.3

TOTAL 760

Serous fluid reduces ME air volume and increases ME pressure

708 – 760

Retracted tympanic membrane

Obstructed Eustachian Tube

Subepithelial capillary

Nasopharynx

RETRACTED TM TO THE EXTREME
IS IT STARTING TO MAKE SENSE?

• Everyone on board?
• Let’s proceed……..

LET’S ALL PARTICIPATE

• An otherwise healthy 30 year old woman presents with vague symptoms, she describes “autophony” in her own words, she battled with this in her 20’s and it seemed to go away while pregnant with her four children

• Having been well educated in the Eustachian Tube’s anatomy and physiology by some cool dude at the most recent Arizona Osetopathic Annual Meeting, you ask the patient to put their head between their legs and ask them to elicit….

• They tell you, “wait a second…..where did my symptoms go?”
WHY?

- Someone have at it........

PATULOUS EUSTACHIAN TUBE

- Estrogen (Premarin) Drops 25 mg in 30 mL normal saline
- Nasal drops, 3 gtt’s TID
- Estrogen leads to congestion, hence pregnancy made her autophony go away
POISEUILLE’S LAW

\[ \text{Resistance} = \frac{8\eta L}{\pi R^4} \]

ETD

- Subjective complaints
  - Dizzy
  - Muffled voice
  - Can’t equalize pressure, feel like I’m on an air plane
  - Won’t pop! (politzerization)

PE:

Ears: retracted TM’s, questionable serous effusions
Nose: Turbinate hypertrophy and rhinitis
MY APPROACH TO TX ETD

- Least invasive to most invasive
- Earn a stranger's trust through diligent, autonomous care and watch the relationship develop into a doctor patient bond
- Start with nasal hygiene and intranasal steroid spray
- Decrease smoking
- Eradicate Sinus Disease

SURGICAL PHILOSOPHY

- Mucosal Preservation
- Front Door/Back Door Approach a.k.a. “The 1,2, Joe Louis”
- Not just pressure equalization tubes, front door, but also treat the torus tubarius, back door
- Apply Poiseuille’s Law
EUSTACHIAN TUBE DILATION

PRESSURE EQUALIZATION TUBE

Posterior Inferior as opposed to Anterior Inferior
T TUBE OR U TUBE

Anchor in dry wall

WHY POSTERIOR INFERIOR?
STILL DIZZY? THINKING MENIERRE’S OR VIRAL

- Dexamethasone drops weekly
- 40 mg/ml → 0.5 cc’s per ear
- Dizziness often subsides

ATTESTATION: DIZZY S/P CVA
ATTESTATION: R/O MENIERRE’S

MY LOVE
TO MY COLLEAGUES..

- Thank you for allowing me to be part of this great organization……
- It is my honor and pleasure……
- questions?……

WORKS CITED

- Eustachian tube at Who Named It?
- 'Ear - Dissector Answers at University of Michigan Medical School
- "Middle Ear, Eustachian Tube, Inflammation/Infection Treatment & Management". Medscape. Retrieved 2012-03-06.
WORKS CITED

• "Eustachian Tube Function and Dysfunction at Baylor College of Medicine


• US Patent #3,982,545, "Middle ear aeration and implant", issued Aug 22, 1974

