Chronic otitis media: a *curious* case of permanent hearing loss

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Outline

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Introduction

• Otitis media with effusion (OME) is generally associated with some degree of fluctuating conductive hearing loss

• Chronic otitis media (COM) can cause additional sensorineural hearing loss (SNHL) resulting from permanent damage to the cochlear
Literature Review - Methods

• Mini-review of evidence-based literature (EBR) was conducted to
  1) evaluate the relation between COM and SNHL
  2) relate the EBR to a case of a 3-year-old with COM
  3) analyze EBR re: its clinical applicability

• Literature search was conducted in the PubMed database

• Six studies met the inclusion criteria and were evaluated in connection with the case of a 3-year-old child with COM
Findings

- The slow prolonged effects of COM can lead to permanent damage to the cochlea and result in SNHL.

- The pathogenesis of SNHL due to COM relates to the passage of toxins from the middle ear to the inner ear through the round window membrane.
Findings cont.

- *Pseudomonas aeruginosa* exotoxin A is capable of crossing the round window membrane.
- This leads to permanent damage of hair cells in the basal part of the cochlea.
Findings cont.

- Patients with COM can suffer from permanent SNHL

- Individuals with unilateral COM demonstrated statistically significant differences (5-10 dB) in the average BC thresholds of the affected and healthy ears

<table>
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<th>BC frequency</th>
<th>500 Hz</th>
<th>1000 Hz</th>
<th>2000 Hz</th>
<th>3000 Hz</th>
<th>4000 Hz</th>
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<tr>
<td>Ear w/ COM</td>
<td>5 (0-10)</td>
<td>10 (5-15)</td>
<td>10 (5-15)</td>
<td>15 (5-20)</td>
<td>15 (5-20)</td>
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<tr>
<td>Contra ear</td>
<td>5 (0-10)</td>
<td>5 (0-10)</td>
<td>5 (0-10)</td>
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<td>P value</td>
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<td>&lt; 0.0001</td>
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</table>
Case Study

• 3-year-old child referred by pediatrician for audiologic evaluation

• History of chronic ear infections, left worse than right

• Passed NBHS

• Delays in speech and language development
Initial audiologic evaluation

- **Tympanometry**
  - Decreased admittance

- **Pure tone testing**
  - Right: slight to mild hearing loss
  - Left: normal to moderate hearing loss

- **Bone Conduction**
  - Unmasked thresholds worse in highs vs lows

- **Poor reliability, patient fatigue**
F/u Audiologic Evaluation

- **Tympanometry**
  - Negative middle ear pressure

- **Pure tone testing**
  - Right: normal hearing sensitivity through 6000 Hz (with slight loss at 2000-3000 Hz) sloping to a mild loss at 8000 Hz;
  - Left: normal through 1000 Hz gradually sloping to a moderate SNHL at 8000 Hz

- **Good reliability**
Discussion

- SNHL can result from COM

- The studies supported COM as a possible cause of the child’s hearing loss

- While threshold increases of 5-10 dB do not generally indicate the need for amplification and/or ALDs, in some individuals these increases can be greater and would require intervention, as in the 3-year-old child with mild to moderate high frequency SNHL
Recommendations

- The child may be a candidate for amplification
- The school district should be notified of the child’s hearing status
- Full educational work-up of the child
- Serial audiograms for monitoring the stability of the threshold differences
Take Home Message

- Clinicians should be aware of the potential of cochlear damage secondary to COM

- Clinicians should be able to appreciate threshold increase on an individual basis

- This case highlights the importance of clinical masking for the assessment of the patient’s audiologic status, even at such a young age
Things aren’t always what they seem – The Cheshire Cat from “Alice in Wonderland”
References

