MULTI-FREQUENCY TYMPANOMETRY: IS IT RELIABLE FOR PREOPERATIVE DIAGNOSIS OF OTOSCLEROSIS?

Dr. Khabti Muhanna
Mr. Khalid Alaqeel
Department of Otolaryngology, PSMMC
Riyadh, Saudi Arabia
Introduction

- Otosclerosis is a hereditary localized disease of the bone derived from the otic capsule.
- It leads to a progressive conductive hearing loss due to fixation if stapes.
- Stapedectomy is the procedure of choice for the treatment, it has good outcome.
- Clinical judgment is the only way to diagnosis such disease.
Introduction

• Clinical Presentation

  • Gradual onset of hearing loss at 15-45 years
  • More in female (1:2)
  • Progressive course rather slow
  • Majority (70%) are bilateral
  • Accelerates with pregnancy
  • Tinnitus
Introduction

- Otomicroscopy
- Usually Normal Tympanic membrane
  - Most helpful in ruling out other disorders
- Schwartze’s sign
  - Red shade in oval window niche area
  - 10% of cases

Normal TM
Introduction

Audiological Evaluation

• Tympanometry
• Impedance testing
  • Acoustic reflexes
  • Multiple-frequency (MFT)
• Pure tones
Introduction
MFT

• Otosclerosis

• Normal
Introduction

Multiple-frequency tympanometry (MFT):

• is a non-invasive, quick, and inexpensive method for examining the middle-ear function.

• It is applicable in cases of:
  • Otosclerosis
  • Partial and total discontinuity of the ossicular chain
  • Malformations of the middle ear
  • Primary cholesteatomas

Introduction

MFT

• Found to be higher in otosclerotic middle ears than normal.*

• Found to be superior to standard tympanometry in evaluation of middle ear function in particularly otosclerosis.**

• That caused researchers to evaluate its sensitivity to detecting Otosclerosis.

*Ref: Miani et al. Sanad Adiol 29(4), 225-37
**Shahnaz Ear Hear, 18, 326-41
Objective

To evaluate the efficiency and role of Multiple Frequency Tympanometry, in patients with otosclerosis, pre and post surgery.
Methods

- Retrospective Study undertaken at the Otolaryngology clinic of Prince Sultan Military Medical City, Riyadh.
- Chart review of patients who under went stapes surgery during the last 7 yrs.
Methods

- **Including criteria:**
  1. Intact normal TM.
  2. MFT done preoperatively.
  3. Stapes fixation confirmed surgically.
  4. No other otological pathology.
  5. Conductive type of hearing loss.
Methods

• 25 patients with confirmed otosclerosis and operated on due to hearing loss, and subjected to MFT pre and post surgery (12 females and 13 males, mean age 34.88, range 12-50 years)

• Control group of 24 individuals free from any systemic and otolaryngological disease (16 females and 8 males, mean age 42.24, range 22-67 years)
Methods

- Full audiological investigation done for the patients before surgery including the MFT by using GSI Tympstar.

- Diagnosis of stapes fixation conformed intra operative and stapes surgery done.

- Further more MFT done postoperatively for 10 patients to determine the sensitivity of the test.
## Results

### Otosclerosis group

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resonant frequency</td>
<td>850</td>
<td>1800</td>
<td>1290</td>
<td>293.68</td>
</tr>
</tbody>
</table>

### Control group

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resonant frequency</td>
<td>550</td>
<td>1350</td>
<td>800</td>
<td>148.03</td>
</tr>
</tbody>
</table>

### Postoperative group

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resonant frequency</td>
<td>700</td>
<td>1400</td>
<td>860</td>
<td>242.44</td>
</tr>
</tbody>
</table>
Results

* p< 0.001 as compared with control and # p< 0.001 as compared with pre operative group using students t test
Results and Conclusion

- A significant increase in RF was observed in Otosclerosis patients.
- RF was significantly reduced in patients treated surgically for otosclerosis.
- The results suggest MFT to be a sensitive and useful tool in the detection of middle ear status and mechanics in patients with otosclerosis.
- MFT is highly recommended as an integral part of diagnosis before stapes surgery.
Thank you