Introduction

- Labyrinthitis ossificans (LO) is a pathological process involving the ossification of structures within the membranous labyrinth of the inner ear leading to sensorineural hearing loss.1-3
- Infectious, inflammatory, traumatic, surgical, and hematologic etiologies have all been linked to LO.4-6
- At 34 patients, this is one of the largest studies regarding LO to date.
- No prior studies describe an etiology-specific pattern of ossification in the labyrinthine structures.

Purpose: The purpose of this study was to identify potential etiology-specific ossification patterns using CT scans of patients with LO.

Materials and Methods

- Temporal bone CT scans from November 2005-January 2012 were reviewed.
- 34 patients with LO were identified
  - 19 had chronic mastoiditis/inflammation or surgery, 7 had meningitis, 5 had sickle cell disease, 2 had trauma, 1 had an unknown etiology
- The following membranous labyrinthine structures were evaluated for ossification:
  - basal, middle, and apical turns of the cochlea
  - lateral, posterior and superior semicircular canals (SCs)
  - vestibule
- The membranous labyrinthine structures were assigned a grading score of 0-4 based on the degree of ossification.
- Statistical analysis was performed using a t-test.
- Exclusion criteria: severely motion
- insufficient clinical data were excluded.

Exclusion criteria: severely motion

Table 1: Grading Score and Ossification Assessment

<table>
<thead>
<tr>
<th>Grading Score</th>
<th>Ossification Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>&lt;25%</td>
</tr>
<tr>
<td>2</td>
<td>25-50%</td>
</tr>
<tr>
<td>3</td>
<td>50-75%</td>
</tr>
<tr>
<td>4</td>
<td>&gt;75%</td>
</tr>
</tbody>
</table>

Results

- The semicircular canals were the most frequently and severely affected structure in all etiologies.
- The lateral semicircular canals were most often affected.
- The apical, middle, and basal cochlear turns were affected with nearly equal frequency.
- The vestibule was least affected in all etiologies.

Local infection and inflammation cases:

- Apical turn of cochlea was more severely involved than patients with meningitis (p=.048).
- Vestibule has significantly decreased ossification grade compared to SCs. Compared to lateral SC (p=.002), posterior SC (p=.005), superior SC (p=.007).
- Vestibule was more severely affected compared to patients with meningitis (p=.04).

Meningitis cases:

- Cochlea was more severely involved than vestibule within the meningitis grouping (p=.01).

Sickle Cell Disease cases:

- No statistically significant difference in ossification of the membranous labyrinth structures.
- Cochlear involvement was less frequent compared to infectious etiologies.

Hearing Loss Findings:

- Patients with local infection/inflammation presented with the most severe hearing loss. 16 of 19(84%) had profound sensorineural hearing loss (SNHL).
- Patients with meningitis presented with the second most severe hearing loss. 3 of 7(43%) had profound SNHL.
- Patients with Sickle Cell Disease had the least severe hearing loss. 1 of 5(20%) had profound SNHL.

Discussion

- Local infection and inflammatory disease cases: had the most severe involvement overall and the most severe hearing loss.
- Prior studies describe the meningitis etiology of LO with the most profound sensorineural hearing loss. 1,3-7,9
- Both the semicircular canals and cochlear turns were severely affected in cases of local infection and inflammation.
- Meningitis cases: were the 2nd most severely affected.
- Semicircular canals were more frequently affected than cochlea.
- Lateral semicircular canals were most severely involved.
- SCD cases: there was much less frequent ossification affecting the cochlea compared to the semicircular canals.

Conclusion

- These findings suggest an etiology-specific ossification pattern for LO.
- Personalized screening and treatment plans based on underlying LO etiology are a future possibility.