Comparison of inner ear measurements on temporal bone CT scan in patients with different etiology of SNHL

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We used manual measurements of inner ear structures to compare inner ears of SNHL children based on GJB2 genotype.

Temporal bone CT was analyzed in 43 patients (86 ears) with bilateral sensorineural hearing loss (21 patients with causal GJB2 genotype, 22 with other etiology), and 100 controls (200 ears). Following measurements were taken by two independent specialists (otolaryngologist and radiologist):

1) LSCC bony island width on axial
2) cochlear height on coronal
3) vestibular aqueduct width at the level of midpoint
4) operculum on axial scans.

Cochlear height and vestibular aqueduct width appear to be significantly different based on etiology of SNHL.

In GJB2 positive group the cochlear height was significantly larger demonstrated by one reader and vestibular aqueduct was significantly narrower than in GJB2 negative group as demonstrated by both readers. Cochlear height was significantly larger also when compared to normal hearing controls as demonstrated by one reader.

Cochlear Height

\[ \text{Cochlear height} = \text{measurement of cochlear height} \]

\[ \text{Vestibular aqueduct width} = \text{measurement of vestibular aqueduct width} \]

Images showing points of realized measurements on temporal bone CT. 1 - lateral SCC bony island width on axial cut, 2 - cochlear height on coronal cut, 3 and 4 - vestibular aqueduct width at midpoint and operculum respectively.

Conclusions:
Using normative inner ear measurements in patients with SNHL we demonstrate significant differences in cochlear height and vestibular aqueduct width based on cause of hearing loss. However, the reproducibility rate between the independent readers should be further increased by “fine tuning” of the evaluation method.

Manual inner ear measurements are hard to reproduce exactly.

Intraclass correlation between the two raters for measurements 1-4 was 84%, 77%, 88% and 86% respectively, showing moderate to good reproducibility.

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