DIAMETER OF LARGEST CT-IDENTIFIABLE HYPOTYMPANIC CELL CORRELATES WITH LARGE MASTOID SIZE

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Abstract

Objective: The hypotympanum is important especially when the surgeon confronts cholesteatomas and tumors, and when a hypotympanic cell simulates the round window niche. We hypothesized that size of hypotympanic cells is not related to size of mastoid.

Methods: Of 41 clinically normal human crania, the five with the smallest mastoid pneumatization areas and the five with the largest areas were assessed by high resolution computed tomography. Specimens were positioned in a custom cephalostat referencing Frankfort plane. The largest diameter CT-identifiable hypotympanic cell, whether found on axial or coronal imaging, was measured.

Results: Wide ranges were found for the largest identifiable hypotympanic cell: 0-11mm. Bilateral symmetry was found for both the largest hypotympanic cells (Spearman r = 0.68, P=0.03), and for mastoid pneumatization (Spearman r = 0.66, P=c.05). The diameter of the largest hypotympanic cell positively correlated with the extent of mastoid pneumatization; for left ears, Spearman r = .73, P=0.02; right, .70, P=.03.

Conclusion: The greatest diameter of largest CT-identifiable hypotympanic cells ranged from 0 to 11mm. Even in this small series of specimens, hypotympanic cell size positively correlated with mastoid size.

Introduction

The hypotympanum is a docile clinically-unconsidered space. Yet, the hypotympanum can be an exciting neighborhood, particularly in the setting of cholesteatoma, dehiscence of the jugular bulb, glomus jugulare tumors, or a hypotympanic cell simulating the round window niche sufficiently to entice a cochlear implant into the wrong place.

Goals of this study:
• What is the size of the largest CT-identifiable hypotympanic cell?
• Is the size of the largest CT-identifiable hypotympanic cell related to mastoid size?
• Is the size of the largest hypotympanic cell bilaterally symmetrical?
• Is the size of the largest hypotympanic cell related to pneumatization of the petrous bone?

Materials & Methods

Institutional Review Board approval was determined, by the IRB, as not applicable to these post-mortem specimens. From 41 clinically normal adult skulls, the five with the largest mastoid pneumatization areas and the five with the smallest mastoids, were assessed by high resolution computed tomography. Specimens were positioned in a custom cephalostat referencing Frankfort plane. The largest diameter CT-identifiable hypotympanic cell, whether found on axial or coronal imaging, was measured.

Statistical analysis was non-parametric. No correction for multiple comparisons was done.

Results

• Malcom D. Graham M.D. provided insight and stimulating conversations about the hypotympanum.
• Jonathan MacLean M.D. is now with McMaster University, Ontario, Canada.

Discussion and Conclusion

A commonality of determinants for the development of mastoid pneumatization and hypotympanic cells (and tracts from them) is endorsed.

The risk of encountering a hypotympanic cell of sufficient size to simulate the depth of the usual cochlea basal turn's inferior quadrant, i.e. about 10 mm, is highest in well pneumatized temporal bones.