Multiple Otosclerotic Foci: Impact on Cochlear Function


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ABSTRACT

Otosclerosis lesions demonstrate a predilection for sites within the otic capsule, including the oval window (OW); i.e., the putamen and superior semicircular focus (SSCC). This is in part due to the peri-otic involvement of pericochlear areas. All specimens (n=68) were evaluated (figs. 1 & 2). All specimens were obtained from patients with clinical otosclerosis [1].

Material & Methods:

Specimens: All specimens within our collection containing at least one otosclerotic foci were identified. Those bones containing only OW otosclerosis (n=28), or oval window plus otosclerosis (n=133) but without any other foci were removed from the study. 68 specimens (range: 17-92 years; mean=69 years; 46 females, 22 males) with either OW and multiple other otosclerotic foci (n=35), or OW foci with cochlear and multiple other otosclerotic foci (n=33) were evaluated (figs. 1 & 2). All specimens were obtained from patients with clinical otosclerosis [1].

Factors evaluated:

To ease focus tabulation, we created and used a classification (fig. 2a-e) based on the origin and extension of each focus (n=203) identified on each H&E stained specimen's slice 1 out of each 10 sections cut to 20 micrometers. Cochlear function was evaluated using average bone conduction (dBHL), audiometric hearing slope (abnormally increased or decreased bone conduction compared with the opposite ear), percentage of discrimination's score (%) as a function of OWCOCHL foci's involvement on BC average. Impact of RW foci reduced the percentage of basal hair cell survival but not on percentage of apical hair cell survival. Nonparametric Spearman correlation between cochlear function and morphology (number and location of the foci) was assessed. Mann-Whitney test was used to compare survival in the basal, middle and apical turns, as well as percentage of hair cell survival (usually profound with one or two responses), respectively, of dendrite extension to the posterior SCC does not involve the endosteal bone of the cochlea.

References:


Cochlear function:

The statistical difference was observed in cochlear function between bones with only 2 locations and bones with a greater number of otosclerotic foci. Cochlear extension of the OW and RW foci reduced the percentage of basal hair cell survival (figs. 3 & 4), without any difference between RW foci with cavitation versus RW foci without cavitation. Impact of RW involvement on BC average was statistically significant (fig. 4, inset). The effect of RW involvement on speech discrimination scores approached significance (p=0.055). OW foci involving the endosteal bone with or without spiral ligament cavitation lowered the discrimination scores, whereas they increased the average BC (fig. 5). Finally, the impact of the number of foci on spiral ganglion cell loss approached significance (p=0.058, r=0.38).

Discussion & Conclusion:

This present report provides a reliable histopathological classification to standardize foci's location and extension. Morphological data obtained support in part the perilabyrinthine centrigraedal distribution theory [4]. Data provided by this new analysis corroborates data previously shown [5, 6] and gives new insights regarding increasing audiological and morphological impact of otosclerosis with involvement of intralabyrinthine structures.

Cochlear involvement revealed an impact on percentage of basal hair cell survival but not on percentage of apical hair cell loss.