The Dominance of Ossicular Route in Sound Transmission

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To the editor:

We read the article of Park et al. [1] with great interest. The finding obtained from this study further supports the notion that the location of tympanic membrane (TM) perforation has no influence on the degree of hearing loss, which contradicts the popular belief (i.e., the posterior quadrant of TM produces more hearing loss than the anterior part of TM). Furthermore, the study has utilized a novel method to evaluate middle ear and mastoid pneumatization volumes which are important indicators in determining the degree of hearing loss.

Early studies in 1970s revealed that the location of TM perforation had influence on the severity of hearing loss. That is, due to the direct sound exposure to oval and round windows (causing phase-cancellation effect), perforation on the posterior part of TM produced more hearing loss than the anterior portion of TM [2]. However, more recent studies have shown that the perforation location on TM has no relation to the degree of hearing loss [3,4]. Furthermore, the discrepancy in result could be possibly because the middle ear volume was not taken into consideration in the earlier studies [4].

In the study of Park et al. [1], the majority of subjects tested had small perforation sizes (<30%) and the mean air-bone gaps were less than 20-dB hearing level (HL). Such small air-bone gaps in TM perforation cases were also observed in the study of Mehta et al. [4]. In this regard, the ossicular route was still dominant in transmitting sounds and hence, no relation between the site of TM perforation and hearing level would be expected (i.e.,

the phase-cancellation effect was not relevant as the sound transmission via the acoustic route was negligible). When the TM perforation size is big enough and the hearing level exceeds 40-dB HL, the acoustic route would become dominant [5]. Perhaps this point is worthy of consideration to further educate the readers.

Experimental studies on cadavers have found no relation between the site of TM perforation and the hearing level, even when the sound transmission is dominated by the acoustic route [3,5]. On the other hand, evidence gathered from clinical studies is scarce. That is, in cases where TM perforation sizes were big, significantly bigger hearing losses were still noted for the posterior location of TM [6]. Accordingly, future well-controlled clinical studies are warranted before a concrete conclusion can be made in regard to this controversial issue.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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