Explanation for the Function of the Middle Ear Mechanism

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Searching for an explanation for the sometimes remarkable improvement of hearing after the Rosen fenestra ovalis operation, we discovered a new phenomenon in the physiology of the middle ear conductive mechanism.

Experiments show that this transformer mechanism is not only a mechanical advantage in the ear's response to aerial sounds but also a decreasing factor in the movements of the cochlear fluids. This factor proved to be 12 db in seven cats. When sounds were administered to the isolated round window, we found a hearing loss of 31 db before and 19 db after removal of the incus.

If we may accept the same influence of the middle ear mechanism in man, the hearing loss after removing of the middle ear constructions will not be 25 db as expected but only 13 db, providing the sounds enter only one window. There are indications for the hearing loss being less than 13 db. Exceptional hearing results after the Lempert fenestration operation, the tympanoplasty type 4 and also the Rosen fenestra ovalis procedure can be explained by this phenomenon. The fenestra ovalis technique was also performed in cats.

With a technique a little different from the fenestra ovalis procedure of Rosen we achieved hearing results in four cats much better than could be expected according to previous ideas about hearing without transformer mechanisms. This hearing loss was only 26 db compared to normal hearing.