

Hypo and retrotympanum: the importance of anatomical variants

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The hypo- and retrotympanum host a variety of crucial anatomical structures¹, characterized by high variability, which are poorly been described. The aim of our study is to describe and classify the anatomical variants of the hypo- and retrotympanum by the means of transcanal endoscopy². We hypothesize that the retro- and hypotympanum are subject to more anatomical variability than actually thought. Moreover, the configuration as bridge variants and variably shaped sinus interconnects the different subregions. A total of 125 middle ears (83 cadaveric dissections) were explored by the means of 3mm straight and angled scopes. The variants were documented photographically and tabularized. The bony crests ponticulus, subiculum and finiculus¹ were most frequently represented as ridges. The ponticulus showed the highest variability with 38% ridge, 35% bridge and 27% incomplete presentation. The subiculum was bridge - shaped only in 8% of the cases, while the finiculus in 17%. The sinus tympani had a normal shape in 66% of the cases. A subcochlear canaliculus was observed in 50%. The retro- and hypotympanum were classified respectively to the present bony crests and sinus in chambers type I to IV. In our opinion, the retro- and hypotympanum have to be considered as a tightly coherent region of the middle ear. For this purpose, we propose a straightforward classification, according to the presence of the different bony crests and sinus forming the different chambers of the retro- and hypotympanum. The introduced classification may also serve as intraoperative assessment, to be aware of the different anatomical subregions. The hidden areas of the retro- and hypotampanum are difficult to access and therefore represent a region of risk for residual cholesteatomatous disease after surgical treatment. The extension below a bridge bony crest or into a deep sinus demands thorough exploration; therefore, exact anatomical knowledge and an effective technique to visualize the whole middle ear are required.

References

- [1] Nogueira et al. (2013) Endoscopic anatomy of retrotympanum. *Otolaryngol Clin North Am*; 46:179-88.
- [2] Presutti et al. (2008) Endoscopic management of acquired cholesteatoma: our experience. *J Otolaryngol Head Neck Surg*; 37(4):481-7.

Keywords

Endoscopic ear surgery; middle ear anatomy; sinus tympani; retrotympanum; hypotympanum; ponticulus; subiculum; finiculus; subcochlear canaliculus.