

Use of Autologous Material in Middle Ear Surgery

The use of autologous material in middle ear surgery has been preferred to that of homologous or alloplastic materials in most situations. However, the use of autologous material in patients with cholesteatoma has been limited by the risk of harbouring residual disease.

In the clinical part of the study we investigated the relationship between residual cholesteatoma and the method of reconstruction of the middle ear ossicles. Regarding the histological findings, two methods of middle ear ossicle treatment were suggested. The first method tested was mechanical clearance of the ossicles by stripping and burring their surfaces under microscopic view. The mechanical treatment was successful in all cases of mildly eroded ossicles. In cases of severely eroded ossicles, this method was unsuccessful. The second method tested was autoclaving of the ossicle for four minutes at 134 °C after mechanical cleaning. The combination of mechanical and thermal treatment eliminated the cholesteatoma entirely in all cases, including those with severely eroded ossicles.

In the experimental part of the study we investigated the reaction of the middle ear mucosa after autoclaving the ossicles and also observed any changes to the ossicles over time since implantation. In an animal experiment (guinea pig) we implanted autoclaved middle ear ossicles with the corresponding part of the tympanic membrane fixed to the manubrium of the malleus. Exploration of the middle ear was carried out 30 days after implantation. The implantation was successful in all cases with no cases of extrusion or disintegration of the ossicles. Autoclaving the ossicles for four minutes at 134 °C impacts superficial devitalisation of the bone sufficiently enough for the squamous cell epithelium on the ossicle's surface to be eliminated. However, ossicles maintained their integrity, firmness and lamellar structure. The number of vital osteocytes decreases, but the bone is not completely devitalised. Middle ear epithelium grows over the autoclaved ossicles. No adverse reactions against the autoclaved ossicles were observed.

This study suggests that the use of autologous ossicles should not necessarily be dismissed for use in the reconstruction of cholesteatomatous ears. The surgeons should be able to remove any superficial disease, if present. The author recommends the use of mechanical cleaning only in cases of mildly eroded ossicles. In cases of severely eroded ossicles, the author recommends either: the application of a combination of both mechanical and autoclaving treatment, or for the ossicles to be disregarded for use in reconstruction.