THREE YEARS OF EXPERIENCE WITH CERAMIC PROSTHESIS

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Reconstructive surgery of the middle ear has been started since Wullstein, Zollner and Moritz introduced tympanoplasty. After about 35 years there are still problems concerning the repair of the sound conductive system. Beside of bone or cartilage also plastic material and steel was used. Wullstein was the first who tried a plastic material in the early fifties which was called Palavit. It had been used in dentology with success but did not stand the test in the middle ear. Polyethylene tubes and different kinds of teflon materials which are successful in stapes surgery failed in interpositioning of the ossicular chain. Especially in cases of middle ear infection it was not tolerated and in many cases the material was extruded. After all many surgeons returned to cartilage and bone. Special problems still exist with reconstructing of the sound conducting mechanism in cases of interpositioning the long distance between the footplate and the drum membrane.

Beside of the difficult modelling of the bone prosthesis it became obvious that bone has an enormous tendency for the formation of sclerotic tissue. Many cases end up with complete refixation of the sound conducting apparatus. On the other hand also autologous cartilage which is excellent for short distance repairing is not ideal for reconstructing big defects. The longer the distance the more insufficient the cartilage becomes because of its flexibility.

Because of the above mentioned disadvantages another material was needed for reconstructive middle ear surgery. Porous polyethylene (Plastipore) and carbon fiber composite (Proplast) have been used for ossicular replacement for many years. The implants are covered by the fibrous capsule but also occasional ingress of fibrous tissue into the surface pores was found. In order to avoid extrusion particularly in cases with reinfection autologous cartilage was interpositioned between the prosthesis and the surrounding tissue on both ends.
In the late seventies the so-called Ceramics have been introduced in reconstructive middle ear surgery. Bio-inert aluminium oxide, bio-active glass and bio-active tri- and tetra-calcium phosphate are available in different forms for the repair of the sound conducting system. During the 1st International Symposium in Otology many informations on chemical and technical details were told to the audience. In order to avoid multidiscussion on the same subject the author would like to demonstrate his own techniques of interpositioning.

The author's technique of posterior tympanoplasty with preservation of the posterior bony canal wall provides nearly normal conditions for reconstructing the membrane with normal dimensions. There is no risk of any destruction which plays an important role in all kinds of the so-calles "weak repair" of the posterior bony canal wall. Connective tissue or temporalis fascia provoke sclerotic healing for a longer period of time and often end up with formation of the wellknown radical cavity. The preservation of the bony annulus including its repair with autologous cartilage has the important advantage concerning the normal conical form of the drum head reconstruction. Helmholtz mentioned in his famous studies on human hearing that the conical form of the tympanic membrane is most effective. On the other hand the closed aerationing system improves the fast healing process of the mucosa lining.

In respect to the above mentioned prerequisites the repair of short distance defects sets no real problem in our hand. The interpositioning of autologous cartilage between the stapes head and the malleus handle or the tympanic membrane still works excellently after about 25 years. The most important problem is the prosthesis of the long distance between the stapes footplate and the membrane. For these cases we tried bio-glass ceramics using the following technique:

To avoid erosions of the footplate a small piece of autologous cartilage was placed on top. Also a small plate of cartilage was placed on the undersurface of the reconstructed membrane to protect the graft. Both ends of the ceramic were glued with Fibrin-glue in connection with the cartilage. All ears were completely dry and non infected for several months. Dry xenograft serosa was used with underlay technique for tympanoplasty. Fibrin-glue was placed on top of the serosa graft as well as on top of the drum head remnant.