OPTIMIZING THE POSITION OF ACTIVE MIDDLE EAR IMPLANTS USING VIRTUAL REALITY

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1. Preoperative planning with patient’s CT data set and software BB fast view. Plan is transferred to Fiagon Navigation system.

2. After registration a pathway is planned and the position of the pointer is color coded.

3. Intraoperative view of microscope. CT data and boundaries of the virtual implant can be visualized as intraocular overlay.

4. Small incisions can be achieved even in unusual positions of the Bonebridge e.g. retrosigmoidal.

5. In small petrous bones (children, less pneumatization) the impression of critical structures (dura, sigmoid sinus) can be optimized. Figure shows drilling a bony island for protection of sigmoid sinus.

Objectives

Bonebridge® implantation is usually a simple and safe procedure. In cases of malformation, prior surgery or a small petrous bone it can be tricky. Therefore, multiple software applications exist for preoperative planning. The aim of this study was to translate the ideal preplanned position of the implant to the OR for a computer-guided surgery.

Methods

A Zeiss® Pintero microscope was connected to a Fiagon® navigation system to achieve intraocular visualization of radiologic images and the boundaries of the segmented Bonebridge® model. The preoperative planning was transferred to the navigation system and the diagnostic CT scan was used for patient to image registration. The dynamic reference frame of the navigation system was screw mounted in the skull. The registration was done by a combination of pair-point and surface matching.

Results & Conclusions

The preoperative planned position of the implant was spatialized to the patient’s anatomy with high accuracy. Thus, the needed compression of dura and/or sigmoid sinus could be minimized intraoperatively.