Most patients with cochlear implantation have improved quality of life, speech recognition and communication, but still there are cases where explantation or reimplantation is necessary. For the last ten years we have 5 explantation surgeries among 167 adults and children. The causes of explantation were device failure, medical complications or patient request.

Medical complications included wound infection, skin flap necrosis, iatrogenic cholesteatoma and delayed internal part or electrode extrusion. In one case, in spite of the good test results, there was poor speech discrimination and performance and the implant was removed by patient request.

Case 1 - Device failure
Five year old girl implanted 2 years ago with Nucleus CI with excellent result. After head trauma, caused by a bicycle accident she had no sound perception. Telemetry tests were abnormal and no waves could be recorded on neural response threshold (NRT) testing. Before re-implantation, a representative from the implant manufacturer confirmed the device failure. Her implant was explanted and immediately replaced by a new one.

The new electrode was fully inserted and telemetry was normal, but there were no NRT responses and auditory performance was worse than the first implantation, but she still had poor hearing. He was well integrated in the deaf community and was explanted by his request. Intraoperatively we found iatrogenic cholesteatoma due to supracanal approach and the electrode array - extruded in middle ear. Classical canal wall up mastoidectomy with tympanic membrane restoration was performed.

Case 2 - Skin flap infection
3 years old boy implanted at age of 2 with good result. After head trauma he had an infected hematoma and flap necrosis. After several revision surgeries and antibiotic courses the infection was not resolved. The telemetry and NRT responses were normal, but the child had severe discomfort in the receiver area. The receiver-stimulator portion of the electrode array were explanated. The cochlear implant electrode array was left within the cochlea and cut at the level of the facial recess. The wound was closed and allowed to heal. Cochlear implantation of the contralateral ear was performed.

Case 3 – Electrode extrusion
20 year old man, implanted at age of 14 in another hospital who had ototora, ear discomfort and headache from several months. Otoscopy showed large tympanic defect, cholesteatoma in the tympanic cavity and purulent secretion in the ear canal. CT scans revealed chronic otitis media with cholesteatoma and the electrode position was not clearly identified. Telemetry was normal, but there were no NRT responses. Freefield audiometry showed thresholds about 65 dB. The patient did not use his processor for a year. He was well integrated in the deaf community and was explanted by his request. Intraoperatively we found iatrogenic cholesteatoma due to supracanal approach and the electrode array - extruded in middle ear. Classical canal wall up mastoidectomy with tympanic membrane restoration was performed.

Case 4 – Soft failure and patient request
19 year old man, operated at the age of 8 with poor speech understanding. Integrity tests were normal but no wave could be recorded on neural response threshold (NRT) testing. He had unsatisfactory FF thresholds. 18 months after implantation he refused to use the speech processor and 10 years later requested explantation. He was well integrated in the deaf community too.

Case 5 - Patient request
17 years old girl, implanted at the age of 9 with normal telemetry and normal NRT responses. She had good FF thresholds - about 25 dB, but speech performance improved slowly. She was not well integrated to the hearing society and used gestometric although she had some pronunciation skills. The explantation was done at her request.

Discussion
Cochlear implantation at our center is done by the classic technique with mastoidectomy and tympanotomy. We use a postauricular curvilinear skin incision with posterior extension at its superior aspect. In all patients, intraoperative NRT testing is routinely performed. We prefer to reimplant the same ear whenever possible and preserve the opposite. In case of active infection, unresponsive to medical treatment, the device is removed leaving the electrode in the cochlea as a stent for delayed reimplantation, serving to prevent cochlear obstruction or ossification.

About 2% of cochlear implants fail, necessitating investigation. In case 1 device failure is categorized as hard failure, because the implant actually had stopped working due to an internal electronic malfunction, but there is not a structural problem. Before re-implantation, a representative from the implant manufacturer conducts a series of integrity tests on the device to confirm the problem. Hard failure is the most common indication for revision surgery, accounting for 40-80% of all revision operations (Zeitler, Budenz & Rolland, 2009). Zeitler and colleagues (2009) report head trauma as being the cause for hard failure revision surgery in as many as 41% of the cases. Patients typically perform just as well with their implants after revision has occurred as they performed initially before their first device failure. However, there’s no guarantee that speech recognition will improve with reimplantation, and it may in fact, become worse. Previous peak performance was more likely to be achieved or exceeded in younger than in older children.

The cause of electrode extrusions is usually unknown, possibly occurring with skull growth or in cases with cholesteatoma formation. In 50% of the cases the electrode can be replaced with a full insertion. Prelingually deaf children often become part of the deaf people community and communicate by jesticomnic language. CI in that cases may impair their social life or interfere with some activities, (airport inspections for example), causing their request for its removal. Age of implantation is critical for success in such cases.

Conclusions
Cochlear implantation is a safe procedure, with severe complications rate below 2%. Its success depends on thorough consideration of the indications, limitations and risks. Revision surgery is not uncommon, so patients should be informed for the possibility of device failure and other complications. Device tests provides important, but not definitive data. Revision cochlear implantation does not guarantee an improved outcome, but it should also be considered when clinical assessment reveals unsatisfactory development of communication skills. A delay to act can have irreversible negative consequences as benefits seem to diminish with age.

References

COCHLEAR EXPLANTATION. WHEN AND WHY?

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