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Small - Incision Technique for Med-El Combi 40+™ Implantation

ABSTRACT

Objectives: 1) To present a technique for implanting the Med-El Combi 40+™ using a small incision with minimal access. 2) To describe the short term postsurgical outcomes in these patients.

Methods: Two patients (1 child and 1 adult) underwent a novel small incision technique for implantation of the Med-El Combi 40+™ cochlear implant device. The short term outcomes in these two patients were described and compared with previous experience using the standard implantation technique citing advantages and possible limitations. As these two patients had bilateral implantation utilizing different techniques on the two sides interesting comparisons could be made on the same individuals.

Results: The preliminary experience with a novel small incision technique for the Med-El Combi 40+™ implantation shows encouraging results in terms of healing and initial performance of these patients.

Conclusion: This small incision technique may be offered to patients especially to those who wish to have bilateral implantations as this allows a less invasive approach, good cosmesis without sacrificing the safety and performance outcomes at least in the short term.

Keywords: *cochlear implantation, minimally invasive surgery*

THE CREDIT goes to Gibson[1] for introducing small incision cochlear implant surgery. Minimal access cochlear implantation techniques include modifications of the classical technique with the aims of reducing the impact of surgery while maintaining the proven safety and outcomes of conventional wide exposure approaches. Previous reports of small incision cochlear implant surgery by O' Donoghue and Nikolopoulos[2] and James and Papsin[3] referred to techniques that were applied to the *Nucleus* implants while those of Jiang et al.[4] and Dalchow and Werner[5] were applied to a wider variety of cochlear implants including the Clarion and Med-El implant systems. The conventional technique of Med-El Combi 40+™ implantation utilizes a 10-12 cm incision, limited mastoidectomy, tympanotomy and cochleostomy, drilling of a bony recess for the implant receiver-stimulator with suture tie down to stabilize the latter. The objective of this paper is to describe our experience on two initial patients in whom we modified the conventional technique of Med-El device implantation by utilizing a smaller retro-auricular incision (4.5 cm) and tie-down ligature, tight subperiosteal pocket with closure of overlying periosteum for device fixation without a bony recess for the receiver-stimulator. As these two patients (1 adult and 1 child) had bilateral implantations that employed the longer incision and wider exposure on one side with the modified minimal access approach on the other side, interesting comparisons of both approaches on the same individuals were then possible.

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CM Chiong signed a disclosure that she is occasionally invited as a speaker for Med-El for which she receives honoraria and travel allowances. Other than this, she does not have any proprietary or financial interests with Med-El or with any organization that may have a direct interest in the subject matter of this manuscript, or in any product used or cited in this study. MB Mueller is the Country Manager (Philippines) of Med-El. EVM Ungui is a clinical audiologist employed by Med-El.

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Case 1

Born with congenital rubella syndrome (with cataracts, patent ductus ateriosus and profound hearing loss) this boy underwent simultaneous (single stage) bilateral cochlear implantation at age 4 on November 2005. On the right (Fig 1A) an elongated 9 cm postauricular incision and on the left a smaller 4.5 cm retro-auricular incision (Fig 1B) were carried out. The standard wide exposure on the right side was performed along with suture tie-down fixation for the receiver-stimulator without drilling of a bony recess.

On the left side, a minimal access tight subperiosteal pocket for the receiver stimulator was utilized without drilling a bony recess but suturing of the periosteum anterior to the electronic package was used to prevent anterior migration. The limited mastoidectomy and cochleostomy could be carried out similarly although the sigmoid sinus was quite anterior in the right side while on the left the facial recess was contracted as the facial nerve limited facial recess dissection in the left side. The mother noted that the healing period was shorter on the left side with the shorter incision as the right side remained tender with the home wound cleaning that was carried out by the mother one week postoperatively. The wounds at two weeks are shown in Figure 2. Six months post-operatively the patient had improved sound detection and could imitate some sounds. Given this short observation period the parents are so far satisfied with the improvement.

Figure1. (Case 1) The right ear is prepared for the elongated postauricular incision with note of minimal shaving of the hair along the planned extension of this incision posterosuperiorly (A) and the left ear with the shorter (4.5 cm) retro-auricular incision (B).

Figure2. (Case 1) This shows the scar of the longer incision in the right ear about two weeks postoperatively (A) compared to the shorter incision in the left ear (B).

Case 2

The first cochlear implantation was done on the left ear of this then profoundly deaf 27 year old male with bilateral congenital large vestibular aqueduct syndrome on October 1998 using the manufacturer's prescribed surgical technique of an inverted J, limited mastoidectomy and drilling of a recess bed for the receiver stimulator with nylon tie-down suture fixation to immobilize the receiver-stimulator onto the skull. He has performed well with this implant with the ability to communicate by telephone.

Eight years later (last January 2006) he underwent contralateral implantation using the 4.5 cm incision (Fig 3A) and minimal access approach in which no bed was drilled but a tight subperiosteal pocket (Fig 3B) and anteriorly placed nylon sutures (Fig 4) were used to stabilize the receiver-stimulator.

The wound healed uneventfully and he has reported significant subjective benefit already even only after 4 months on this second implant. A temporal bone CT provides evidence for a stable inset of the receiver-stimulator on the right side even with this minimal access approach (Fig 5A). Notably, the electronic package on the left side placed in the drilled bony recess has been well integrated as shown in Figure 5B.

Figure 3. (Case 2) There was no need to shave the hair when the small incision is carried out for the right ear in this patient who had left cochlear implantation using a standard inverted J incision 8 years earlier (A) . The template for the receiver-stimulator is used to guide the development of a tight subperiosteal pocket (B).

Figure 4. (Case 2) This shows the electronic package placed within the subperiosteal packet with nylon suture tie-down ligatures for device fixation.

DISCUSSION

Complications from cochlear implantation related to flap breakdown can range from 4.5% to 17%[2,6,7]. Longer incisions that required more hair to be shaved and wider flap dissection related to the classical cochlear implant surgery have also been a source of concern among potential candidates or parents of prospective candidates

in considering this surgical option for hearing rehabilitation[2,8]. In all surgical disciplines the trend has been for minimally invasive surgery that reduces the trauma related to surgical access. The positive experience of other centers with minimal access cochlear implant surgery encouraged development of the smaller retro-auricular incision and device fixation using tie- down ligature, tight subperiosteal pocket and closure of periosteum without drilling of the bony recess for the receiver-stimulator. As both the standard incision and the small incision with minimal access technique was applied in these two patients who had bilateral cochlear implantations using the Med-El Combi 40+™ devices there was the unique opportunity to make these interesting comparisons on the same patients. This initial experience with a small incision and minimal access for implantation of Med-El cochlear implant device is very encouraging in terms of healing and initial performance outcomes.

The small incision technique can be considered especially in cases of bilateral implantation of the Med-El devices given the shorter operative time, less invasive approach and good cosmesis in both adults and children as shown in this report.

Short term outcomes of about 6 months to 12 months at least for these two patients were indeed in favor of the minimal access approach. However further observation will be needed to ensure the long term benefit of this short incision and modified device fixation methods in our setting.

Figure 5A (Case 2). CT Scan showing receiver -stimulator on right side without drilling of an implant bed.

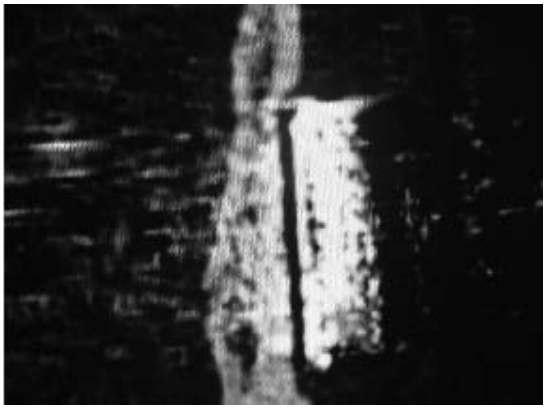

Figure 5B (Case 2). CT Scan showing receiver -stimulator on the left side with drilled implant bed.

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