

# New Experience in Cochlear Implantation at Benghazi Medical Center

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## Abstract

**Aims:** Deafness is a pathology that interferes in several aspects of the emotional, psychological, social, and intellectual life. Cochlear implants are electronic devices that allow hearing rehabilitation. This study is carried out to show our experience in cochlear implantation at Benghazi Medical Center, Libya. **Patients and Methods:** A retrospective descriptive study was performed over 110 patients at the Otorhinolaryngology Department, Benghazi Medical Center, between August 2012 and April 2016. The patients were analyzed according to the age, sex, type of implant inserted, approach, and intraoperative and postoperative complications. Two types of implant devices were used: cochlear and MED-EL. Surgery was done by the same surgical team. **Results:** Seventy of all patients operated for cochlear implantation were male (63.6%), while forty were female (36.4%). One hundred and four (94.5%) were children and 6 (5.55%) were adults. One hundred (91%) cases were prelingually deaf and 10 (9%) were postlingual deafness. Telemetry showed satisfactory neural response in 107 (97.35) cases. Failure to insert the electrode in 1 (0.9%) case as the cochlea was ossified bilaterally. Extrusion of the receiver took place in 1 (0.9%) case. One (0.9%) patient had extrusion after 2 years; another 1 (0.9%) had wound dehiscence. Despite our few years of experience in cochlear implantation, we have achieved the requirement of our patients. The need for structured services and trained professionals in this type of procedure is clear.

**Keywords:** Cochlear implantation, hearing deficiency, hearing rehabilitation

## INTRODUCTION

Hearing deficiency is a pathology that interferes in several aspects with the emotional, psychological, social, and intellectual life and is one of the most frequent chronic disabilities.<sup>[1]</sup> The interest on hearing impairment should expand beyond the epidemiological data to take into account the broad psychophysical and social factors that are likely to be impacted by hearing loss and which might lead to a significant decrease in quality of life.<sup>[2,3]</sup> Hence, cochlear implants (CIs) are electronic devices that allow hearing rehabilitation of individuals with severe to profound bilateral sensorineural hearing loss that would not benefit with the use of hearing aids. CIs stimulate electrically the fibers of the hearing nerve, substituting in partial for the function of the cochlea. A CI device supplies electrical stimulation directly to the auditory nerve, circumventing the damaged hair cells in the cochlea, providing a perceived sensation of hearing.<sup>[4-7]</sup> Thus, a CI does

not restore normal hearing but provides a sensory neuronal stimulation for sound vibration, resulting in sound perception and subsequent motor neuronal reaction.<sup>[8,9]</sup> Extensive auditory, speech, educational, and psychological testing are performed before and after implantation.<sup>[10]</sup> Different types of implants are used with good results and this is attributed to the technology of the appliance that is improving regularly, as well as with the growing experience of the surgeons. This type of surgery is relatively new in Libya. The present study aims to present our experience at the Otorhinolaryngology Department, Benghazi Medical Centre, Libya.

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## PATIENTS AND METHODS

This is a retrospective descriptive study performed at the Otorhinolaryngology Department, Benghazi Medical Center, between August 2012 and April 2016. One hundred and ten patients were included in this study. The workup protocol in our center starts with investigating patients with severe to profound hearing loss by doing audiological assessment and then imaging studies in addition to psychological study. Other laboratory investigations and counseling were performed before proceeding to surgery. The same surgical team using the same operating theater performed all surgeries. The surgical techniques were the same for adult and pediatric cases. Two surgical approaches were used. Cochleostomy approach was used for eighty cases and round window approach for thirty cases. For both approaches, mastoidectomy was performed first, then drilling of the receiver-stimulator bed, followed by posterior tympanotomy, and finally insertion of electrodes.<sup>[11]</sup> Intraoperative facial nerve monitoring was used during surgery in all cases. Two types of implant devices were used: Cochlear Nucleus 6 system (AUSTRALIA) in 100 patients and SONATA CI from MED-EL (AUSTRIA) in ten patients. Postoperatively, telemetry was done for all patients to verify the positioning of the electrodes without fluoroscopic confirmation. The patients' demographics included age, sex, type of implant inserted, approach, intraoperative complications, and postoperative complications. Prelingual congenital deafness with normal psychiatric and neurologic and postlingual cases were included for this study. Cases of mental retardation of autism were excluded from this study.

## RESULTS

Results are summarized in Table 1, where 63.64% of all patients were in the age group of 1–6 years and 27.27% were 7–12 years old. Nearly 63.64% of the patients were males. Regarding surgical approach, 72.73% of the cases had cochleostomy approach and 27.27% were operated through round window approach. About 90.91% of the patients received nucleus type of implants (cochlear) and the other 9.09% were implanted with Sonata (ME-DEL) type.

Nearly 72.73% of the patients were prelingually deaf and only 27.27% had postlingual deafness. Telemetry showed satisfactory results in 107 patients. For the other three patients, telemetry showed higher impedance also, as they were postmeningitis children. In one case, the failure of insertion of the electrode was due to ossified cochlea. Another case presented after 6 months with extrusion of the receiver due to infection, and the implant was removed and reimplanted. The third patient came with dehiscence of the wound and a rotational flap was performed. There was no preoperative complication, except for two cases who had gusher. These two patients had postoperative vertigo and were discharged from the hospital after 3 days.

## DISCUSSION

Cochlear implantation surgery is relatively recent in our center. Cochlear implantation according to the

**Table 1: Patients' classifications according to the different variables**

Classification of patients according to	n (%)
Age groups (years)	
1-6	70 (63.64)
7-12	30 (27.27)
13-18	4 (3.64)
>18	6 (5.45)
Gender	
Male	70 (63.64)
Female	40 (36.36)
Surgical approach	
Cochleostomy	80 (72.73)
Round window	30 (27.27)
Device company	
Nucleus from cochlear	100 (90.91)
Sonata from MED-EL	10 (9.09)
Type of deafness	
Prelingual deafness	100 (90.91)
Postlingual deafness	10 (9.09)
Complications	
Wound dehiscence	1 (0.91)
Gusher	2 (1.82)
Extrusion of implant	1 (0.91)
Failed insertion	1 (0.91)
Vertigo	2 (1.82)

international standards should be done at earlier age to have good results. Recent research demonstrates positive outcomes in children implanted under 12 months of age.<sup>[12]</sup> Developing research on earlier implantation has led to a change in the current FDA criteria, allowing infants to reach their speech and hearing potential faster. Cochlear implantation has been considered as a safe and reliable operation. In our case, more cochleostomy approach was performed which was reported to be less traumatic.<sup>[13]</sup> The complications are comparable to international figures. One of our cases (0.91% of all cases) had flap necrosis and extrusion of the implant; this complication is rare but serious. Stamatiou *et al.*<sup>[14]</sup> had reported that reimplantation was necessitated by device failure (6 cases; 2.8%) or device extrusion (1 case; 0.5%). Skin flap necrosis was seen with one case in our study; it is considered to be one of major complications that deserve special attention. Although complications are infrequent after CI surgery, they might occur despite careful preoperative planning and meticulous surgical technique.<sup>[15]</sup>

Three of our candidates were postmeningitis with whom we had difficulty during surgery. Cochlear-implanted children with meningitis-related deafness exhibit higher impedances, and so to optimize the outcome in postmeningitic deaf children, surgery is advisable at an early stage before the onset of cochlear ossification.<sup>[16]</sup> Therefore, we recommend early cochlear implantation for patients with bilateral profound deafness secondary to meningitis.

## CONCLUSION

Despite our short experience in the field of cochlear implantation, we have encountered very few complications. These results are very encouraging for us to provide children in this country with this kind of advanced technology, even during the difficult time that the country going through. Better results can be obtained if this kind of surgery is performed at an earlier age.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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## ملخص المقال باللغة العربية

### تجربة جديدة في زراعة القوقعة في مركز بنغازي الطبي

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**الهدف:** الصمم هو أحد الأمراض التي تتداخل في عدة جوانب من الحياة العاطفية والنفسية والاجتماعية والفكرية. زراعة القوقعة هي أجهزة إلكترونية تسمح بإعادة تأهيل السمع. أجريت هذه الدراسة لإظهار تجربتنا في زراعة قوقعة الأذن في المركز الطبي ببنغازي.

**المرضي والطرق:** أجريت دراسة وصفية بأثر رجعي على 110 مريضاً في قسم أمراض الأنف والأذن والحنجرة، مركز بنغازي الطبي، بين أغسطس 2012 وأبريل 2016. تم تحليل النتائج وفقاً للعمر والجنس، ونوع ونهج الزرع، والمضاعفات أثناء وبعد العملية الجراحية.

**النتائج:** 70 من جميع المرضى الذين خضعوا لعملية زرع قوقعة كانوا من الذكور (63.6%)، في حين كان 40 من الإناث (36.4%). 104 كانوا أطفالاً (94.5%)، وبقائهم (6) كانوا بالغين (5.55%). كانت 100 حالة (91%) من الصم السابق للنطق (قبل سن التكلم)، و10 (9%) من الصمم ما بعد سن التكلم. أظهرت القياسات عن استجابة عصبية سمعية مقبولة في 107 حالة (97.35%) بعد الزرع. حدث فشل في إدخال القطب في حالة واحدة (0.9%) نتيجة تحجر القوقعة من الجهتين. تم إخراج القوقعة في حالة واحدة (0.9%)، كما تم إخراج القوقعة من مريض واحد (0.9%) بعد سنتين من الزرع. حدث تفزر الجرح في مريض واحد (0.9%). حالة واحدة عانت من ورم دموي (0.9%).

**الاستنتاج:** على الرغم من خبرتنا القليلة في مجال زراعة القوقعة، فقد حققنا متطلبات مرضانا. الحاجة إلى الخدمات المنظمة والفنيين المدربين في هذا النوع من الإجراءات ضرورية وواضحة.

**الكلمات المفتاحية:** زرع القوقعة، نقص السمع، إعادة تأهيل السمع، بنغازي.