Auris Nasus Larynx xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Auris Nasus Larynx

journal homepage: www.elsevier.com/locate/anl

Complications after cochlear implantation in adult patients. 10-Year retrospective analysis of a tertiary academic centre

Carlos Miguel Chiesa Estomba *, Teresa Rivera Schmitz, Frank Alberto Betances Reinoso, Lenin Dominguez Collado, Manuel Estevez Garcia, Ana Isabel Lorenzo Lorenzo

Otorhinolaryngology – Head and Neck Surgery Department, University Hospital of Vigo, Vigo, Spain

ARTICLE INFO

Article history:
Received 25 January 2016
Accepted 28 March 2016
Available online xxx

Keywords:
Adult
Cochlear
Implant

ABSTRACT

Objective: Cochlear implants (CI) are electronic devices that enable the auditory rehabilitation and the management of individuals with severe to profound bilateral hearing loss, and nowadays, advanced age is not considered a contraindication for cochlear implantation and several studies have shown that older adults do benefit from CI, with improvements in hearing abilities and quality of life.
Methods: Retrospective analysis of patients older than 18 years who underwent cochlear implant surgery in a tertiary academic centre.
Results: 57 patients met the inclusion criteria: 25 (43.9%) male and 32 (56.1%) female. Total percentage of minor complication was 24.6% and major complication was 17.5%. The most common minor complication in our series was vestibular disorder, and the most common major complication was device failure. No correlation was found among age, previous meningitis, anatomical variables or comorbidities with the appearance of complications.
Conclusion: Cochlear implantation is a safe surgical technique for rehabilitation of severe to profound sensorineural hearing loss. According to our results, neither the age over 65 years nor the presence of comorbidities does have a direct impact over the complication rates in our patients.

1. Introduction

Cochlear implants (CI) are electronic devices that enable the auditory rehabilitation and the management of individuals with severe to profound bilateral hearing loss in children as well as adults [1]. These devices work due to electric stimulation of the auditory nerve fibres, in such a way as to replace cochlear function. Around the world different types of devices and techniques are being applied to improve surgical results, and several large studies have published low rates of intraoperative and postoperative complications in experienced hands [2–4].

Nowadays, advanced age is not considered a contraindication for cochlear implantation and several studies have shown that older adults do benefit from CI, with improvements in hearing abilities and quality of life [5–8].

Different complications have been reported for this type of procedure in the literature: scalp infection, wound haematoma or seroma, foreign body reaction, meningitis, facial nerve injury (Paralysis or paresis), eardrum perforation, vertigo, device malfunction, device extrusion, electrode migration, trauma to the implant site or receiver-stimulator, acute infection of the middle ear and mastoid in children or cholesteatoma. These complications (minor and major) can have a direct economic impact in the health care system [9].

* Corresponding author at: Otorhinolaryngology – Head and Neck Surgery Department, University Hospital of Vigo, Rúa Pizarro, #11, 4to D, 36204 Vigo, Spain. Tel.: +34 635 793 435.
E-mail address: chiesaestomba86@gmail.com (C.M. Chiesa Estomba).

http://dx.doi.org/10.1016/j.anl.2016.03.012
0385-8146/

Therefore, the aim of this study is to describe the rate of complications in older patients (older than 18 years) after Cochlear implantation in a tertiary university hospital, trying to determine the possible influence of age, comorbidities or anatomical abnormalities.

2. Material and methods

A retrospective analysis of patients older than 18 years who underwent cochlear implant surgery in our centre between June of 2005 and June of 2015 was included. The identification of cases was achieved by searching in the medical records of our department using the codes from the International Classification of Diseases (ICD)-9. This study was approved by the ethics committee of our institution.

Demographic data (age, gender), medical background, hearing loss aetiology, type of complications and type of surgery were obtained by review of the medical records. In our centre imaging of petrous temporal bones (CT) must be performed systematically before cochlear implantation in children and adults with congenital hearing loss and in all patients with profound hearing loss, and also we perform an MRI in those patients with history of bacterial meningitis in order to identify inner ear malformations, cerebrospinal fluid (CSF) leak, or cochlear ossification according to FDA recommendation. CI patients were excluded of the analysis in case of missing information in patient's charts.

Our patients were equipped with cochlear implant devices: Freedom – CI24RE, Contour Advance – CI24R, Contour – CI24R and CI512w Contour Advance Electrode (Cochl ear Ltd., Lane Cove, Australia). The surgery was performed by three specialized otologists. All devices were implanted using a postauricular lazy S-shaped skin incision of 4 cm in length; the skin overlying the temporalis muscle fascia was raised to create the skin flap and then, the posterior lip of the incision was undermined to a distance of 2 cm to allow the muscle and periosteum to be incised in a straight line in a different plane from and without contact with the previous incision, thereby creating the second flap. After the double flap creation, a limited mastoidectomy and facial recess approach with posterior tympanotomy was performed.

The severity of the complication was classified according to Hoffman and Cohen's criteria, and they were considered minor if resolution occurred spontaneous or after medication had been administered, and was considered major if it required hospitalization or additional surgery [10]. The found complications were: facial palsy, meningitis, implant failure, haematoma, CSF leak, wound dehiscence, wound infection, otitis media, implant extrusion, electrode movement, vertigo, and tinnitus. Finally, complications were classified according to their time of occurrence: intraoperatively, early postoperatively (<3 months) or late postoperatively (>3 months).

Statistical analysis was performed using SPSS for Windows, version 20.0 (SPSS, Inc., IL, USA). Quantitative variables in the study were expressed as mean ± standard deviation. Chi-square test and paired *T*-test were used in the analysis and a $p < 0.05$ was considered significant.

3. Results

During this period, 76 patients over 18 years of age were implanted in our centre. 25 (43.9%) male and 32 (56.1%) female patients met our inclusion criteria resulting in a total of 57 implanted patients included in this study. The mean age was 48.47 ± 14.35 years (Min: 18/Max: 74), with only 7 patients being older than 65 years and the other 50 younger than 65 years. No correlation was found between age and rate of complications (Tables 1 and 2). Regarding comorbidities 10 (17.5%) suffered diabetes, 16 (28.1%) high blood pressure, 18 (31.57%) lipid metabolism disorders; of those 16 had (28.1%) hypercholesterolemia and 2 (3.5%) hypertriglyceridemia, 4 (7%) patients had hypothyroidism, 3 (5.3%) patient smoked over 20 cigarettes per day, and only 1 (1.8%) patient admitted to drink more than 70 g/day of alcohol (Table 1).

The type of hearing loss was prelingual in 5 (8.8%) patients, perilingual in 1 (1.8%) and postlingual in 51 (89.47%) patients (Table 3). The aetiology of hearing loss was genetic in 5 (8.8%) patients, acquired in 19 (33.3%) and unknown in 33 (57.9%) patients (Table 3). No correlation was found between comorbidities and minor or major complications (Table 4). There were minor complications in 14 cases (24.6%) and major complications in 10 (17.5%) patients. 7 (12.3%) patients presented some degree of anatomical malformation, but interestingly, none of those patients developed complications after surgery.

Complications were classified according to the time of presentation: intraoperative, early postoperative and late postoperative period complications (Tables 5 and 6). Minor complications were treated conservatively. Vertigo was seen in 5 (8.8%) patients, and tinnitus was seen in 6 (10.5%) patients. There was 1 (1.8%) case of suture dehiscence, due to a head trauma during the healing process. 1 (1.8%) patient developed a haematoma that resolved spontaneously after 10 days without surgical revision and another patient reported temporary dysgeusia.

Unfortunately the most common major complication was the failure of the device found in 4 (7%) patients, all of them

Table 1
Demographic data and comorbidities.

Sex		
Male	25	43.9%
Female	32	56.1%
Mean age	48.47 ± 14.35	(Min: 18/Max: 74)
Patients complications		
Older than 65 years	7	*p*: 0.733
Younger than 65 years	50	*p*: 0.430
Comorbidities		
DM	10	17.5%
HBP	18	31.57%
Hypercholesterolemia	16	28.1%
Hypertriglyceridemia	2	3.5%
Hypothyroidism	4	7%
Tobacco	3	5.3%
Alcohol	1	1.8%
Complication		
Minor	14	24.6%
Major	10	17.5%

Please cite this article in press as: Chiesa Estomba CM, et al. Complications after cochlear implantation in adult patients. 10-Year retrospective analysis of a tertiary academic centre. Auris Nasus Larynx (2016), http://dx.doi.org/10.1016/j.anl.2016.03.012