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Preservation of residual hearing after cochlear implant surgery: an exploration of residual hearing function in a group of recipients at South African cochlear implant units

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2015-03-02
http://hdl.handle.net/10539/17065

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Abstract

The preservation of residual hearing is becoming increasingly important in cochlear implant surgery. Surgical and technological advancements have resulted in this preservation, which have in turn led to the expansion of the inclusion criteria. Conserving residual hearing is a positive prognostic indicator for improved hearing abilities. ***Objective:*** The primary aim of the current study was to explore the preservation of residual hearing following cochlear implantation in a group of recipients at two major cochlear implant centres in South Africa. Secondary objectives included investigating whether a relationship existed between the hearing findings and certain factors, namely aetiology, age, gender, the duration of pre-operative hearing loss, degree of pre-operative hearing, duration between surgery and unaided post-operative hearing testing, model and manufacturer of implant, surgical technique employed and surgical complications relating to intracochlear structures. ***Design:*** A quantitative paradigm was adopted and exploratory research conducted, with a retrospective data review being the design followed. ***Study sample:*** The sample consisted of audiological records from 60 observations - i.e. 53 patients, seven of whom were fitted bilaterally. Additionally, the sample consisted of 50 surgical records. The audiological and surgical records were selected using purposive sampling and consisted of records from post-lingually hearing-impaired participants (ranging from six to 59 years), and pre-lingually hearing-impaired children (from six years). ***Data analysis:*** The researcher conducted a comparative analysis of unaided audiological test results pre- and post-operatively. Factors documented to have a possible influence on cochlear implant surgery outcomes were examined in an attempt to establish relationships that may exist. Findings were analysed by means of both inferential and descriptive statistics. ***Results:*** Results indicated a high success rate of 92% preservation of residual hearing – 42% partial and 50% complete - in cochlear implant recipients across all frequencies post-operatively. A total post-operative hearing loss was found in only 8% of cochlear implantees across all frequencies. There was a direct correlation between the surgical techniques as well as cochlear implant type and the successful hearing findings, in the absence of surgical complications. Preservation was achieved with the majority of implantees receiving the Contour Advance electrode from Cochlear with complete insertion via the scala tympani and the Advance Off-Stylet surgical technique being used. Surgical complications had significant negative effects on the post-operative hearing outcomes and resulted in hearing loss. Other factors explored, namely the duration and degree of pre-operative hearing loss and duration between surgery and unaided post-operative hearing testing did not have any negative effect on the hearing findings and positive outcomes were achieved, regardless of age, gender and aetiology of hearing loss. ***Conclusions:*** Findings suggest

that cochlear implant surgery is successful in terms of preservation of residual hearing and that factors such as age, gender, aetiology of hearing loss and degree of pre-operative hearing loss did not have an impact on the hearing findings post-operatively. It is apparent that where there were no surgical complications, the surgical techniques and implant type used by the surgeons in this study resulted in positive outcomes and successful preservation of post-operative residual hearing - this was evidenced by a 92% hearing preservation rate. This is a positive prognostic indicator for individuals with pre-operative residual hearing as the preserved residual hearing allows for the potential of electro-acoustic stimulation (EAS), which in turn has its own hearing benefits. These findings will add to the limited body of knowledge on the topic in South Africa. Furthermore, these findings have implications not only for audiologists, but for Ear, Nose and Throat surgeons and other professionals working in the field as well as for future cochlear implant candidates with residual hearing, medical aids and the Department of Health in South Africa.

Keywords: cochlear implant, cochlear implantees, preservation, residual hearing, cochlear implant surgery