Surgical complications in Cochlear implantation

Thesis

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BY

Mahmoud Mohamed Mohamed Ahmed Mustafa Sharaf

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SUPERVISORS

Prof. Dr. Mohamed Abd Al-Rahman Al-Shazly

PROFESSOR OF OTORHINOLARYNGOLOGY, HEAD&NECK SURGERY

CAIRO UNIVERSITY

Prof. Dr. Ahmed Hasan khashaba

PROFESSOR OF OTORHINOLARYNGOLOGY, HEAD&NECK SURGERY

EGYPTIAN MILITARY MEDICAL ACADEMY

FACULTY OF MEDICINE – CAIRO UNIVERSITY

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Abstract

The candidacy for implantation is considered separately for adults and children. As outlined in the 1995 National Institutes of Health (NIH) consensus statement on cochlear implantation, adult candidacy is noted as being successful in postlingually deaf adults with severe-to-profound hearing loss with no speech perception benefit from hearing aids. Prelingually deafened adults must be counseled in regard to realistic expectations, as language and open-set speech discrimination outcomes are less predictable. Children are considered candidates for implantation at age 12 months, and, because of meningitis-related deafness with progressive cochlear ossification, occasional earlier implantation is necessary.

Key word

AICA- ECOG- IT-MAIS- OHCS- COCHLEAR IMPLANTATION

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

* قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ *

"صدق الله العظيم"

البقرة آية ٣٢

To my

Mother,

Mahmoud sharaf,,,,,,,,

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At first and end all thanks should be for my God.

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LIST OF ABBREVIATIONS

AAO-HNS …… American Academy of Otolaryngology-Head and Neck Surgery

ABR……..Auditory Brainstem Response

ACE …… Above Combination Encoders

AD ……Auditory Dyssynchrony

AICA …….. Anterior Inferior Cerebellar Artery

AN …….. Auditory neuropathy

BTE ……. Behind The Ear

CAEP …….. Cortical Auditory Evoked Potentials

CC …….. Common Cavity

CDC …….. Centers for Diseases Control and Prevention

CH …….. Cochlear Hypoplasia

CII ……..Clarion 2

C.I.……..Cochlear Implantation

CIS …….. Continuous Interleaved Sampling

CNC …….. Consonant-Nucleus-Consonant

CSF …….. Cerebrospinal Fluid

CT …….. Computed Tomography

CUNY …….. City University of New York

ECOG …….. Electrocochleography

ENG ……. Electronystagmography

EVA …….. Enlarged Vestibular Aqueduct

EVAS ..... Enlarged Vestibular Aqueduct Syndrome

FDA..... Food and Drug Administration

HINT ..... Hearing in Noise Test

HRCT .....High Resolution Computed Tomographic

IAC ..... Internal Auditory Canal

IHCs ..... Inner Hair Cells

IP ..... Incomplete Partitioning

IQ ..... Intelligence Quotient

IT-MAIS .....Infant-Toddler Meaningful Auditory Integration Scale

LNT..... Lexical Neighborhood Test

LOC.....Lateral Olivocochlear Bundle

MLNT ..... Multisyllabic Lexical Neighborhood Test

MOC..... Medial Olivocochlear Bundle

MPS .....Multiple Pulsatile

MRI .....Magnetic Resonance Imaging

NIH.....National Institutes of Health

NRI.....Neural Response Imaging

NRT .....Neural Response Telemetry

OAEs ..... Otoacoustic Emissions

OHCs ..... Outer Hair Cells

OME .....Otitis Media with Effusion

PCV7 ..... 7-valent Pneumococcal Conjugate Vaccine

PE tubes ..... Pressure Equalization tubes

PPv23 ……. 23 variant Pneumococcal Polysaccharide Vaccine

SAS ……Simultaneous Analog Stimulation

SCC ……Semicircular Canal

SPEAK …… Spectral Peak

U.S. …… United States

INTRODUCTION

CHAPTER (1)

INTRODUCTION

Cochlear implant is a device that delivers electrical stimulation through an array of electrodes to a bundle of cochlear nerve fibers. And, it is established as an effective and safe method of rehabilitation for profoundly deaf patients **(Kim et al., 2004).**

In 1957, Djourno and Eyries made the observation that activation of the auditory nerve with an electrified device provides auditory stimulation in a patient. This observation was considered the seminal observation that paved the way for modern cochlear implantation. In 1963, Doyle J, and Doyle D's early experiments in scala tympani implantation preceded the first House/3M single-channel implant in 1972. Multichannel devices introduced in 1984 have replaced single-channel devices by virtue of improved speech recognition capabilities. As of 2006, nearly 100,000 cochlear implants are estimated to have been performed worldwide **(Megerian and Murray, 2006).**

Cochlear implants are the first true bionic sense organs. The human cochlea is an electromechanical transducer. Cochlear implants, like other human hair cell, receive mechanical sound energy and convert it into a series of electrical impulses **(Roland et al., 2003).**

Sound is first detected by a microphone (usually worn on the ear) and converted into an analog electrical signal. This signal is then sent to an external processor where it is transformed into an electronic code. This code is transmitted via radiofrequency across the skin by a transmitting coil. Ultimately, this code is translated by the receiver-stimulator into rapid electric impulses distributed to electrodes on a coil implanted within the cochlea **(Driscoll et al., 2004).**

Introduction

The candidacy for implantation is considered separately for adults and children. As outlined in the 1995 National Institutes of Health (NIH) consensus statement on cochlear implantation, adult candidacy is noted as being successful in postlingually deaf adults with severe-to-profound hearing loss with no speech perception benefit from hearing aids. Prelingually deafened adults must be counseled in regard to realistic expectations, as language and open-set speech discrimination outcomes are less predictable. Children are considered candidates for implantation at age 12 months, and, because of meningitis-related deafness with progressive cochlear ossification, occasional earlier implantation is necessary. Investigations are ongoing into extending the age of early routine implantation to younger than 12 months. audiological criteria include severe-to-profound sensorineural hearing loss bilaterally and poor speech perception under best-aided conditions, with a failure to progress with hearing aids and an educational environment that stresses oral communication **(Megerian and Murray, 2006)**.

During the last twenty years, the indications for cochlear implants (CIs) extended significantly due to positive experience with CIs, improved CI technology, and safer surgery. Providing a postlingually deaf adult with a unilateral CI and prelingual child younger than 5 year have been the earliest indication and remains the standard indication. However, CIs are also indicated for prelingually deaf adults, and for children younger than one year old. Recently, CIs are also indicated for adults with residual hearing; when best aided sentence recognition scores in quiet are lower than 70%. CIs for patients with residual hearing sometimes imply the use of bimodal CI; a device that stimulates the cochlea both electrically and acoustically. Another promising evolution is bilateral implantation. Nowadays it has also become possible to place a CI in the malformed cochlea **(Deggouj et al., 2007).** .