The Possible Role of High Resolution Computed Tomography Imaging (HRCT) in Predicting the Visibility and Position of the Round Window in Cochlear Implantation Surgery

Thesis

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Nada Zakaria Zakaria El Sayad El Ablak

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List of Abbreviations

Abb.	Full term
BAEP	*Brain Stem Auditory Evoked Potential*
CA	*Cochlear Aquiduct*
CAT	*Combined Approach Technique*
CI	*Cochlear Implant*
CSF	*Cerebro-Spinal Fluid*
CT	*Computed Tomography*
FC	*Facial Canal*
FN	*Facial Nerve*
GGSPN	*Groove for Greater Superficial Petrosal Nerve*
GN	*Geniculate Ganglion*
GSP	*Greater Superficial Petrosal nerve*
HRCT	*High Resolution Computer Tomography*
Hz	*Hertz*
IAC	*Internal Auditory Canal*
JN	*Jacobson's Nerve*
KHz	*Kilo Hertz*
LO	*Labyrinthitis Ossificans*
LSC	*Lateral Semicircular Canal*
MCF	*Middle Cranial Fossa*
mg	*Milligram*
MPTA	*Mastoidectomy Posterior Tympanotomy Approach*
MRI	*Magnetic resonance imaging*
OSL	*Osseous Spiral Lamina*
OW	*Oval Window*
PSSC	*Posterior Semicircular Canal*
PTA	*Pure tone Audiometry*
RW	*Round Window*

List of Abbreviations **cont...**

Abb.	Full term

RWM *.....Round Window Membrane*
RWN *.....Round Window Niche*
SD *.....Standard Deviation*
SNHL *.....sensorineural hearing loss*
SPBT *.....Superficial Part of Basal Turn*
SSC *.....Superior Semicircular Canal*
SSNHL *.....Sudden sensorineural hearing loss*
ST *.....Scala Tympani*
SV *.....Scala Vestibuli*
TM *.....TympanoMastoidectomy*
VA *.....Vestibular Aqueduct*

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ABSTRACT

Background: High-resolution computed tomography (HRCT) magnifies the role of preoperative imaging for detailed inner and middle ear anatomical information and enhances more efforts for better dependent correlation and measurements of round window (RW). Imaging is essential in the preoperative evaluation of sensorineural hearing loss (SNHL) patients who are candidates for CI. Surgeons need to be alert regarding the anomalies and pathologies that may represent a potential surgical hazard or that may that may require modification of the surgical approach.

Objectives: To study the possibility of preoperative assessment of round window in relation to the facial recess in order to anticipate the type of round window exposure before surgery by using High-resolution computed tomography (HRCT) scan.

Patients and Methods: This study included 50 children, aged 3 to 5 years who underwent unilateral cochlear implant with round window electrode insertion and had pre-operative high-resolution temporal bone CT scan were included. All patients had severe to profound bilateral sensorineural hearing loss, which was unaidable with hearing aids.

Results: Our study showed that the α value of the angle between the line connecting the leading edge of the facial nerve to the midpoint of the round window and the median sagittal line measured in the preoperative CT scans was associated with the difficulty of intraoperatively exposing the round window membrane. When the α value was larger than a certain degree, the round window membrane was not easily exposed.

Conclusion: Successful cochlear implantation by posterior tympanotomy approach depends on conclusive identification of the RWN, which may be difficult in patients with limited RWN

visibility. Facial nerve canal in the facial recess may be obscuring the round window.

Keywords: High Resolution Computed Tomography Imaging, Round Window, Cochlear Implantation Surgery