COCHLEAR IMPLANTATION
“LIFE LONG COMMITMENT”

KIERTIYOS KOMIN, MD
ADVISORY LEVEL OF ORL
RAJAVITHI HOSPITAL
DEPARTMENT OF MEDICAL SERVICES
prevalence
patient selection
surgery & devices
rehabilitation
outcomes
key of success
PREVALENCE

- 3:1000 in new born
- 1;3000 in population
CONGENITAL HEARING LOSS

- 60% are hereditary
- 70% are nonsyndromatic
- 80% are autosomal recessive
ACQUIRED HEARING LOSS

- infection
- progressive
- Meniere’ disease
- otosclerosis
- idiopathic
EARLY DETECTION + HABILITATION

- OAE
- ABR
- ASSR
- BOA
- VRA
HEARING AIDS

- fit as soon as possible
- can't remove distortion from speech
- can't make voice clear in noise
COCHLEAR IMPLANT

- the only device to restore hearing in total deaf individual
- main indication is clarity not loudness of speech
## Candidacy criteria

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18 yrs</td>
<td>2 yrs</td>
<td>18 mo</td>
<td>12mo</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Onset of SNHL</th>
<th>postlinguistic</th>
<th>postlinguistic adults &amp; pre&amp;postlinguistic children</th>
<th>pre&amp;postlinguistic adults &amp; children</th>
<th>pre&amp;postlinguistic adults &amp; children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of SNHL</td>
<td>profound</td>
<td>profound</td>
<td>severe-profound adult profound children</td>
<td>severe profound 2yrs&amp;older profound &gt;2yrs</td>
</tr>
<tr>
<td>Adult speech scores</td>
<td>0%</td>
<td>0%</td>
<td>40% or less</td>
<td>60% in the best aided condition</td>
</tr>
<tr>
<td>Child speech scores</td>
<td>not candidates</td>
<td>0% open-set</td>
<td>less than 20%</td>
<td>Lack of auditory progress</td>
</tr>
</tbody>
</table>

Lack of auditory progress
CRITERIA 2010

Adult & children

Unaided 70dBHL or worse in the better hearing ear

Unaided 80dBHL or worse in the worse hearing ear
REFERRAL GUIDELINE

Cochlear Implant audiological indications sensorineural hearing loss

Unaided air conduction hearing threshold guide for Cochlear implant referral.
Shaded area indicates hearing range of cochlear implant candidates.
LIMITATION OF AUDIOMETRY

- speech perception varied markedly for same pure tone threshold

- Aided audiogram: more important

- Speech perception is Gold Standard (consider at 70% CUNY sentence score)
Guidelines set such that expect at least 75% chance of improvement with cochlear implant, so recommend implantation if for:

<table>
<thead>
<tr>
<th>Post-lingually deafened adults</th>
<th>Pre-lingually deafened adults</th>
<th>Children able to perform speech perception tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 65% or worse phoneme score in better ear</td>
<td>• evidence that auditory cues assist communication</td>
<td>• 70% or worse phoneme score in both ears</td>
</tr>
</tbody>
</table>
CANDIDACY ASSESSMENT

- Audiological test
- Language assessment
- Social interactive
- Personal drive
- Expectation
- Family and financial
SURGERY & DEVICES

- master cochlea anatomy
- master surgical technique
- choose devices
COCHLEA ANATOMY

RELATIONSHIP
COCHLEOSTOMY SITE

AVOID DAMAGE BASILAR MEMBRANE & SPIRAL LIGAMENT
TRANS-FACIAL RECESS IS THE ONLY WAY TO INSERT ELECTRODE CORRECTLY
Currently, there is great variation in cochleostomy location


50.9% DRILL PORTION OF ROUND WINDOW
Finley et al (2008)

Cochleostomy site & control of depth insertion increase word recognition by 36%
ELECTRODE PLACEMENT EFFECTS OUTCOME

Robert Briggs
ELECTRODE PLACEMENT EFFECTS OUTCOME

Robert Briggs
Figure 1. Schematic diagram of the cochlea showing the relationship between the oval window and the vestibule and scala vestibuli, as well as between the RW and the scala tympani. The arrows indicate electrode trajectories. Trajectory 1 indicates insertion via the RW and early contact of the electrode with the modiolar wall of the scala vestibuli. Trajectory 2 indicates insertion via the crista fenestra, in line with the longitudinal axis of the lower basal turn of the scala tympani. sm = scala media; ow = oval window.
NUMBER OF ACTIVE ELECTRODE EFFECTS OUTCOME
SINGLE VS MULTIPLE CHANNEL ELECTRODE

The only reason why CI succeed was because of multiple electrode (over 400,000 user)

Single channel: do not consider
Minimum 4 electrodes required for understand speech
(Bob Shannon)

At least 20 separate hearing channel are required to hear clearly in the present of background noise
(Michael Dorman)
AUDIO VERBAL THERAPY

IMPORTANT PART
OUTCOMES - CHILDREN

- early implant is essential
- speech improvement
- education in conventional school
- nearly normal life
OUTCOMES-ADULT

- can understand more speech
- better in crowd
- some can use telephone
- better life
CI COMMUNITY
KEY OF SUCCESS

- patient selection
- surgery & device
- audio verbal training
LIFE LONG COMMITMENT

- physician
- multi disciplinary team
- CI company
FOR THE SAKE OF PATIENT
THANKS YOU