COCHLEAR IMPLANTATION: A SURGEON’S PERSPECTIVE
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CONFLICTS OF INTEREST
- RESEARCH AND/OR ADVISORY BOARD MEMBER WITH:
  - COCHLEAR, MEDEL, AND ADVANCED BIONICS

LASKER-DEBAKEY CLINICAL MEDICAL RESEARCH AWARD

Auditory Rehabilitation
- One option...do nothing.
- Hearing aids (air-conduction)
  - Implantable (e.g., Baha, Vibrant Soundbridge)
    - Soundbridge
  - Cochlear implants (CI)
  - Hybrid / EAS
  - Auditory-brainstem implants (ABI)

“...medical education begins with the patient, continues with the patient, and ends with the patient.”
Dr. William Osler
**IMPORTANCE**

- $2.5 billion lost yearly in productivity
- Deaf more likely to be unemployed
  - 40% vs. 18% (18-44yrs old)
- $2 billion to provide equal access
- $120 billion educational costs
- 56% (vs. 81%) graduate high school
- 5% graduate from college (vs. 13%)

**CI PERFORMANCE VARIABLE**

- **PATIENT FACTORS:**
  - AGE
  - SOCIOECONOMIC STATUS
  - EDUCATION
  - FAMILY SUPPORT
  - ETIOLOGY OF DEAFNESS
  - RESIDUAL HEARING
  - DURATION OF DEAFNESS
  - HEARING AID USE

**TEAM APPROACH IMPORTANT**

- NEED PROPER TYPE OF DEVICE/ELECTRODE
- NEED SURGICAL EXPERTISE
- AUDIOLOGICAL EXPERTISE/COUNSELING
- PATIENT

**PROPER CONSENT**

- PATIENTS’ EXPECTATIONS HIGH
  - Over-realistic
- UNDERPROMISE AND OVERDELIVER

**COCHLEAR IMPLANT SUCCESSES HAVE LED TO:**
BILATERAL CI PLACEMENT

- Better hearing in silence, noise
- Sound localization
- More natural hearing
- Reduced listening effort
- Improved QOL

SINGLE-SIDED DEAFNESS

HYBRID CI / EAS

BENEFITS OF HYBRID / SOFT SURGERY TECHNIQUES

- Ability to hear sounds when sound processor off
- Improvement in hearing in noisy environments
- Improvement in music appreciation
- May reduce risk of vestibular damage
YOU NEED PROPER ELECTRODE PLACEMENT

**Surgical Techniques**
- Mastoidectomy
- Facial Recess
- Receiver/Stimulator Seating
- Expose Round Window (RW)
- Electrode Insertion
  - “Soft Surgery”
  - Atraumatic Insertion through Round Window
- Use of steroids (IV and TT)
- Use of CO2 laser

**Factors that may enhance the preservation of residual hearing**

- **Potential for Acoustic Trauma while drilling a cochleostomy**
  - Vibration and Loudness Trauma
  - Mechanical Trauma due to electrode insertion that includes:
    - Insertion Angle and Location
    - Fracture of the osseous spiral lamina
    - Disruption of the basilar membrane or spiral ligament

- **Fracture to the osseous spiral lamina**
- **Disruption of the basilar membrane or spiral ligament**
- **Insertion Speed**

- **Foreign Body Reaction**
  - Electrode
  - Bone dust and/or blood
  - Inflammation – Short Term/Long Term

- **Facial Recess: Landmarks**
  - Chorda Tympani
  - Incus Buttress

- **Facial Nerve**

- **Round Window**

**Mastoidectomy**

Facial Recess Drilled

Visualize Round Window Niche

Drill Overhang to See Round Window

Insertion Will Be Through RW (No Cochleostomy)

Receiver/Stimulator Seating

Open RW Gently with Pick: No Drilling!
Slowly, Slowly Insert Electrode

Electrode Has Been Inserted

Seal RW with Fascia

View Before Closure

View of Electrode in Opened Cochlea

Cochlear Nucleus Implants Selection Guidance

Selection Considerations:
- Length as a factor of Preservation?
- Testing for OAE required for Hybrid I recommendation.
- Greater than 30 year duration of overall deafness
- Stable vs Progressive Hearing Loss
- Potential for threshold shift

Angular Degree of Insertion

Hybrid (16mm)
Slim (20mm)
Slim (25mm)
AUDITORY BRAINSTEM IMPLANTATION

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WHAT DISEASE DOES THIS PATIENT HAVE?

Auditory Brainstem Implants (ABI)

- First implanted 1979
- >600 implanted worldwide
- FDA approved- 2000
- Approved for use in adults in the U.S.
  - Use in children in Europe
- Primary indication: NF-2 (bilateral AN’s)

COMPARABLE DIAMETER
INDICATIONS

• NF2
• COCHLEA/NERVE APLASIA
• LABYRINTHINITIS OSSIFICANS
• TEMPORAL BONE FRACTURES
• POOR CI RESULTS?
• ADULT AND PEDIATRIC

CASE 1- NF2 PATIENT

NF2 PATIENT

Auditory Brainstem Implants (ABI)
ABI APPROACHES

- TRANSLABYRINTHINE
- RETROSIGMOID
- EXTENDED MCF
"WE TRY NEVER TO FORGET THAT MEDICINE IS FOR THE PEOPLE. IT IS NOT FOR THE PROFITS. THE PROFITS FOLLOW, AND IF WE HAVE REMEMBERED THAT, THEY HAVE NEVER FAILED TO APPEAR. THE BETTER WE HAVE REMEMBERED IT, THE LARGER THEY HAVE BEEN."

GEORGE W. MERCK