CLINICAL HISTORY &
Physical Examination
BINAURAL HEARING
FAR-ADVANCED OTOSCLEROSIS  
(Non-measurable BA Gap)

Clues to Diagnosis

History

- Positive family history
- Onset in early adulthood
- Gradually progressive loss
- Use of hearing aid
FAR-ADVANCED OTOSCLEROSIS
(Non-measurable BA Gap)

Clues to Diagnosis

Examination

- Wears aid well despite extent of loss
- Voice - modulation, pronunciation
- Schwartze’s sign
STAPES SURGERY
Controversies

- Stapedotomy/Stapedectomy
- Window opening? Size?
- Window covering?
- Laser? Argon, Yag, CO$_2$
- Prosthesis?
STAPEDOTOMY
LOCAL ANESTHESIA WITH SEDATION

VERSED® (Midazolan)
Dormicum®
Flormidal®

DEMEROL®

ZOFTRAN® (Ondansetron)

Sedation: Versed-Demerol Titration

• Xylocaine 1% c Epinephrine 1:100,000
• Sodium Bicarbonate 9% 2cc in 20cc
• Inject 3 cc
STAPEDOTOMY

- Gusher 0.2%
- Stapedial artery remnant 0.7%
- Marginal flap tear <1.0%
STAPEDOTOMY

TORP or IRP: Indications

N = 486

- Incus Short or fixed: 2.6%
- Malleus head fixation: 1.2%

Total: 3.8%
Laser

Avoids mechanical manipulation of the footplate and oval window membrane
# OTOSCLEROSIS

**Footplate (Oval Window) Pathology**

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>76%</td>
</tr>
<tr>
<td>Anterior</td>
<td>57%</td>
</tr>
<tr>
<td>Ligamentous</td>
<td>12%</td>
</tr>
<tr>
<td>Bipolar</td>
<td>7%</td>
</tr>
<tr>
<td>Diffuse</td>
<td>13%</td>
</tr>
<tr>
<td>Solid</td>
<td>9%</td>
</tr>
<tr>
<td>Obliterated</td>
<td>2%</td>
</tr>
</tbody>
</table>
STAPEDOTOMY
Prosthesis Length

- 4.00 - 4.25 mm: 76%
- Greater than 4.5 mm: 6%
- Less than 4.0 mm: 18%
Ø 0.7 mm
Until 1986
The SMart Piston
Nitinol-Teflon
(Nitinol = Nickel-Titanium Alloy)
Results
STAPEDOTOMY

Bone-air Gap Closure

Closed or overclosed  75%
10 dB or less  90%
15 dB or less  96%

PRIMARY STAPEDECTOMY
N=486

Sensorineural Impairment

Temporary  8.4%
Permanent  2%
Dead ear  1 case
WITHOUT STATISTICAL SIGNIFICANCE

- Children
- Schwartze sign
- Degree of SNHL
- High-tone SNHL
- “Labryntization” ???

STAPEDOTOMY IN CHILDREN
Differential Diagnosis

Congenital Stapes Fixation
Juvenile Otosclerosis

STAPEDOTOMY IN CHILDREN

<table>
<thead>
<tr>
<th>Condition</th>
<th>Age of Diagnosis</th>
<th>Mal./Incus Abnormalities</th>
<th>Positive Family History HL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital Stapes Fixation</td>
<td>3 yrs old</td>
<td>25%</td>
<td>10%</td>
</tr>
<tr>
<td>Juvenile Otosclerosis</td>
<td>10 yrs</td>
<td>3%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Preop air bone gap

- Congenital Stapes Fixation: 35.2 dB
- Juvenile Otosclerosis: 27.8 dB

Postop improvement

- Congenital Stapes Fixation: 15 dB
- Juvenile Otosclerosis: 22 dB

Postop air bone gap <10 dB

- Congenital Stapes Fixation: 44%
- Juvenile Otosclerosis: 82%

De la Cruz A, Angeli S., Otolaryng Head Neck Surg, 121:487
STAPEDOTOMY

- Gusher: 0.2%
- Stapedial artery remnant: 0.7%

* p = 0.017
COMPLICATIONS

THE LOOSE WIRE SYNDROME

- Fluctuation in hearing acuity
- Distortion of sound
- Changes in discrimination
- Temporary improvement with middle ear inflation
REVISION STAPEDECTOMY:
(N=356)

Short / Displaced Prosthesis 80%
Incus Necrosis Partial/total 25%
Incomplete Platinotomy 8%
Malleus/ Incus fixation 4%
Fistula 1%

HOUSE EAR CLINIC
Stapedectomy Late Failure

- Displaced prosthesis: 54%
- Incus necrosis: 15%
- Bony closure: 15%
- Oval Window fistula
- Malleus refixation
HEARING RESULTS

• ABG ≤ 10dB

• Stapedotony  85 - 95%
• 1st Revision  46%
• More Revisions  33%
• Residual CHL  10%
• Recurring CHL  35%

Silverstein et Al, 1994 - Nadol, 2001
STAPEDOTOMY: LATE FAILURE

1) Prosthesis

2) Normal Incus?

Prof. G. Babighian
Padua, Italia
Cross section of incus long process- major blood supply is from multiple vessels within bone. There is also a submucosal vascular plexus.

S. Merchant MD, MEEI, Boston

3D reconstruction of vessels within the incus. Many vessels run up and down in the bone. Note also branches that come to the surface to anastomose with the submucosal plexus (submucosal plexus is not shown in the figure). Therefore, **tight crimp cannot cause ischemic necrosis**

S. Merchant MD, MEEI Boston
OTO-MIMIX®
(Hydroxilapatite Bone Cement)
“IRP”
Incus replacement Prostheses

STAPEDOTOMY: IRP or TORP
N = 486

- Incus problem 2.6%
- Malleus head fixation 1.2%
- Oval window exposure 0.8%
- TOTAL 4.6%
The Nadol’s SMart®
Malleo-vestibular
Prostheses
Results

PRIMARY STAPEDOTOMY
Post-Op Gap
N = 486

Less than 10 dB  90 %
Dead ears       1/486  0.2 %
**PRIMARY STAPEDOTOMY**
SN HEARING LOSS > 20 dB
N = 486

- Temporary: 8.4%
- Permanent: 2%
- Dead ear: 1 case

**REVISION STAPEDECTOMY**
Hearing Post-Op
N = 356

- Gap > 10 dB: 60%
- Dead Ears: 1.4%
STAPEDOTOMY
Preferences

- Local anesthesia, sp. revisions
- Microfenestra 0.7 mm
- Window covering- blood
- Laser Argon, CO₂
- Prosthesis?

REVISION STAPEDECTOMY
Conclusions

- Air-Bone Gap < 40 dB
- Vestibular symptoms:
  Do not re-open the oval window
- Obliterative otosclerosis:
  Do NOT re-drill the footplate
Antonio De la Cruz, MD
House Ear Institute    Los Angeles, California