Middle ear implants.
Our experience

Alexandria International Combined ORL Congress
Dr R Meller, Pr J Magnan
CHU NORD Marseille

Number of patients implanted since 1998

Vibrant soundbridge : 80 since 1998
Otologics (Semi-implantable)) : 55 since 2001
Carina (Fully-implantable) : 17 since 2005

Total : 152
WHY A MIDDLE EAR IMPLANT?

2 situations:
- SNHL with difficulty with conventional hearing aid
  - Ear canal problem (Eczema, stenosis..)
  - Sometimes bad results with hearing aid
- Mixed hearing loss: new indications
HOW IT WORKS

Conventional hearing aid

Amplifier  Speaker
Microphone  Processor

COCHLEA
DIFFERENT KIND OF MIDDLE EAR IMPLANTS
IN OUR PRACTICE

-Semi implantable: Vibrant Soundbridge, Otologics
-Fully implantable: Carina
Two systems of semi-implantable VIBRANT SOUNDBRIDGE OTOLOGICS

Implant = implanted part + external part

Implanted part

VIBRANT SOUNDBRIDGE OTOLOGICS
External part

Position

45°
Vibrant soundbridge surgery

FMT should be parallel to the stapes

Posterior tympanotomy

Transmeatal approach

Transmeatal approach
First patient trans-meatal approach
10/06/2002
7 years after
CARINA
Fully implantable middle ear implant

Microphone
Digital Signal Processor
Battery
IS-1 Connector
Receiver Coil
Magnet
Transducer
Lead

Connector IS-1

SEMI IMPLANTABLE

TOTALLY IMPLANTABLE
Command on/off

Charger
INDICATIONS IN SNHL
Indications in SNHL

- Moderate to severe hearing loss
- **Impossibility** (or Unsatisfaction) with Properly fitted hearing aids
- Adult

Audiogram showing different frequency levels and hearing levels in dB HL.

Application range

VSB Symphonix vs Otologics MET

Graphs showing the frequency range and hearing level for each device.
INDICATIONS IN MIXED HEARING LOSS

VIBRANT MEDEL
Where to clip the FMT

- Long process of the uncus if it's possible
- Head of the stapes
- Round Window

- Other possibilities
  - Oval window
  - Combination with TORP/PORP

Treatment of Additional Conditions

- Open cavity
- Malformations
- Myringoplasty...

The Vibrant Soundbridge for Conductive and Mixed Hearing Losses

Indication Ranges

SNHL

Conductive/mixed HL

air conduction ~ bone conduction

bone conduction as used in the European multi-center study
Secondary Otosclerosis

incus

piston prosthesis

Stapes Footplate

Warble tones thresholds Pre OP / Piston / Piston + VS

0,125 0,25 0,5 1 2 4 8 10 kHz

0 20 40 gain

60 80 100 dB HL

FMT on stapes
• Attachment of FMT onto the RW-membrane

• Bypassing the middle ear and treating directly sensorineural hearing loss
CARINA

Indications

SNHL

MHL

Application range

Other conditions

Conventional hearing aid impossible
Previous ossiculoplasty non successful
Patient understanding +++
Carina™ Design Flexible = Applications Multiple

Conductive and mixed hearing loss
Surgery = Tympano. Post.

Sensorineural Hearing loss
Surgery = atticotomy

Implant
Carina on stapes

Study

- 12 adults (36 - 83 years) (av. 59.5).
- Implanted between September 2005 to June 2008
- 8 cases of SNHL (1 severe)
- 4 cases MHL (implanted on the stapes)
## Questionnaire

<table>
<thead>
<tr>
<th>Name</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
<th>Case 9</th>
<th>Case 10</th>
<th>Case 11</th>
<th>Case 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>36</td>
<td>75</td>
<td>62</td>
<td>46</td>
<td>65</td>
<td>67</td>
<td>42</td>
<td>46</td>
<td>83</td>
<td>74</td>
<td>70</td>
<td>54</td>
</tr>
<tr>
<td>Type of HL</td>
<td>Mod snhl</td>
<td>Mhl</td>
<td>Mod snhl</td>
<td>Severe hl</td>
<td>Mhl</td>
<td>Mod snhl</td>
<td>Mod snhl</td>
<td>Mod snhl</td>
<td>Mod snhl</td>
<td>Mhl</td>
<td>Mhl</td>
<td>Mod snhl</td>
</tr>
<tr>
<td>Site of implant</td>
<td>standard</td>
<td>Stapes</td>
<td>standard</td>
<td>standard</td>
<td>Stapes</td>
<td>standard</td>
<td>standard</td>
<td>Stapes</td>
<td>Stapes</td>
<td>standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of device</td>
<td>User</td>
<td>User</td>
<td>User</td>
<td>Non-user</td>
<td>User</td>
<td>User</td>
<td>User</td>
<td>User</td>
<td>User</td>
<td>User</td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>Global satisfaction</td>
<td>Satisfied</td>
<td>Satisfied</td>
<td>Satisfied</td>
<td>Poorly satisfied</td>
<td>Satisfied</td>
<td>Satisfied</td>
<td>Satisfied</td>
<td>Satisfied</td>
<td>Satisfied</td>
<td>Very satisfied</td>
<td>Satisfied</td>
<td></td>
</tr>
<tr>
<td>2nd attempt</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Device Failure</td>
<td>YES</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

### Results

- 10/12 satisfied
- 1/12 very satisfied
- Pain: 2/12
- Abnormal noise: 6/12
- Charging problems: 4/12

## Functional gain

![Gain tonal graph](image)
Conclusion

• For SNHL:
  – Moderate hearing loss:
    • Vibrant soundbridge or Otologics (Fully or Semi implantable) can be used
    • Same audiologic results of Fully or Semi implantable
  – For severe SNHL we should prefer Otologics semi implantable

• Very good results for MHL