Microtia and aural atresia: An integrated approach to management

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Microtia and atresia: Overview

- Microtia
- Treatment choices for families to consider
  - Atresia
  - Microtia
  - Development of treatment plan
- Surgical techniques
  - Microtia
  - Atresia
Microtia*

* Always look for the canal

**Microtia (unilateral): Timetable**

<table>
<thead>
<tr>
<th>Age</th>
<th>Assessment</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infancy (0-12 months)</td>
<td>Hearing, Renal US</td>
<td>(Early intervention) (Amplification)</td>
</tr>
<tr>
<td>Toddler (1-3 yrs)</td>
<td>Monitor S/L, Monitor hearing, Middle ear</td>
<td>(Early intervention) (Amplification) Discuss options Microtia and atresia</td>
</tr>
<tr>
<td>Preschool (3-5 yrs)</td>
<td>Ear specific audio, CT scan (t-bones), C spine x-rays, Dental assessment</td>
<td>(Amplification) Discuss options Answer questions Review of photos</td>
</tr>
<tr>
<td>Early school (5-7 yrs)</td>
<td>Audiogram, Dental assessment</td>
<td>(Amplification) Accommodations Review options Start microtia repair</td>
</tr>
<tr>
<td>School age (8-12 yrs)</td>
<td>Dental/OMFS assessment</td>
<td>(Amplification) Accommodations Consider mandibular surgery</td>
</tr>
</tbody>
</table>
# Microtia and Atresia: Management Options

<table>
<thead>
<tr>
<th>Condition</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microtia</td>
<td>1. Do nothing</td>
</tr>
<tr>
<td></td>
<td>2. Prosthetic management</td>
</tr>
<tr>
<td></td>
<td>3. Staged surgical reconstruction</td>
</tr>
<tr>
<td>Atresia/conductive hearing loss (unilateral)</td>
<td>1. Do nothing</td>
</tr>
<tr>
<td></td>
<td>2. Bone conduction hearing aid</td>
</tr>
<tr>
<td></td>
<td>3. Softband</td>
</tr>
<tr>
<td></td>
<td>4. BAHA</td>
</tr>
<tr>
<td></td>
<td>5. Atresia repair*</td>
</tr>
</tbody>
</table>

### Atresia (unilateral): Management Options

<table>
<thead>
<tr>
<th>Approach</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do nothing</td>
<td>Minimize risk (?)</td>
<td>Unilateral HL</td>
</tr>
<tr>
<td>BCHA</td>
<td>No surgery</td>
<td>Cosmesis Comfort</td>
</tr>
<tr>
<td>BAHA</td>
<td>Simple surgery</td>
<td>Cosmesis Device required</td>
</tr>
<tr>
<td></td>
<td>Predictable</td>
<td>Soft tissue issues</td>
</tr>
<tr>
<td></td>
<td>Excellent hearing result</td>
<td>Insurance coverage</td>
</tr>
<tr>
<td>Atresia repair*</td>
<td>Cosmesis</td>
<td>Complex surgery</td>
</tr>
<tr>
<td></td>
<td>No device</td>
<td>Less predictable result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modest hearing benefit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ongoing care</td>
</tr>
</tbody>
</table>
Aural atresia: Classification systems*

<table>
<thead>
<tr>
<th>Feature</th>
<th>De la Cruz</th>
<th>Jahrdsdoerfer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minor</td>
<td>Major</td>
</tr>
<tr>
<td>Mastoid pneumatization</td>
<td>Normal</td>
<td>Poor</td>
</tr>
<tr>
<td>OW/FP</td>
<td>Normal</td>
<td>Abnormal/absent</td>
</tr>
<tr>
<td>FP-VII relationship</td>
<td>Normal</td>
<td>Abnormal</td>
</tr>
<tr>
<td>Inner ear</td>
<td>Normal</td>
<td>Normal</td>
</tr>
</tbody>
</table>

* Do not live by the classification system alone

Autogenous rib reconstruction and BAHA

- Position of BAHA
  - Should be about 3 cm posterior to hairline
- Timing of BAHA procedure relative to microtia management
  - Controversial
  - Presence of BAHA may interfere with 3rd stage, depending upon the microtia surgeon
**Atresia repair: Preoperative counseling**

- Cannot get complete closure of air bone gap

- Timing of atresia repair depends upon plan for microtia management
- Expect ABG about 30 dB
- Patients may be able to accommodate hearing aid
- Post operative activity limitations
  - Avoid strenuous activity for 1 month
  - Avoid water exposure for 3 months
- Possible issues with otorrhea
- Variable ability to use ear level amplification
- Revision rate – approximately 25%

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**Microtia: Management options**

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prosthetic</td>
<td>Adhesive retained</td>
<td>Appearance</td>
<td>Insecure&lt;br&gt;Ongoing prosthetic care&lt;br&gt;Daily maintenance&lt;br&gt;Use restrictions</td>
</tr>
<tr>
<td></td>
<td>Implant retained</td>
<td>Appearance&lt;br&gt;Secure retention</td>
<td>Multiple procedures&lt;br&gt;Removal of remnant and soft tissue&lt;br&gt;Ongoing prosthetic care&lt;br&gt;Daily maintenance&lt;br&gt;Use restrictions</td>
</tr>
<tr>
<td>Reconstructed</td>
<td>Rib cartilage (autogenous)</td>
<td>Autogenous tissue&lt;br&gt;Minimal maintenance&lt;br&gt;Becomes sensate&lt;br&gt;Atresia repair</td>
<td>Appearance&lt;br&gt;Donor sites&lt;br&gt;Multiple surgeries</td>
</tr>
<tr>
<td></td>
<td>MEDPOR®</td>
<td>Less donor site morbidity&lt;br&gt;Less variability in carving</td>
<td>Foreign body&lt;br&gt;More challenging to do atresia repair</td>
</tr>
</tbody>
</table>
### Microtia and atresia: Development of treatment plan

- Educate family about timeline and overall options
- Stress importance of language development during infancy
- CT scan of temporal bones at about 5 years of age
- Review options for hearing interventions
- Ascertain preferences for microtia management
- Develop treatment plan

### Microtia and atresia: Developing the treatment plan

<table>
<thead>
<tr>
<th>Microtia options</th>
<th>Atresia options</th>
</tr>
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<tbody>
<tr>
<td>1. Do nothing</td>
<td>1. Do nothing</td>
</tr>
<tr>
<td>2. Prosthetic management</td>
<td>2. Bone conduction</td>
</tr>
<tr>
<td>3. MEDPOR®</td>
<td>3. hearing aid</td>
</tr>
<tr>
<td>4. Staged rib reconstruction</td>
<td>4. Softband</td>
</tr>
<tr>
<td></td>
<td>5. BAHA</td>
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<tr>
<td></td>
<td>5. Atresia repair*</td>
</tr>
</tbody>
</table>

* Favorable candidates; determine timing
**HISTORY**

- 1937  Gillies  maternal rib graft
- 1959  Tanzer  autologous rib-solid block
- 1966  Cronin  silastic
- 1974  Brent  autologous rib
- 1991  Reinisch  MEDPOR®
- 1994  Nagata  stacked autologous rib
Microtia: Factors in decision making

- Bony structures
  - Orbit
  - Zygoma
  - Mandible
- Soft tissue considerations
  - Hair line
  - Atrophy
- Atresia/ hearing options
- Social considerations
  - Patient expectations
  - Family expectations

Microtia: Factors in decision making

- Timing of microtia reconstruction
  - Context of overall management of HFM
  - Overall growth
- Patient preference
  - Aesthetic outcome
  - Donor site morbidity
- Ongoing access to care
Microtia: Staged autogenous rib reconstruction

- Stage I: Rib graft implantation
- Stage II: Transfer of lobule
- Stage III: Release of ear with FTSG
- Stage IV: Atresia repair and creation of tragus

Microtia: Stage I
Creation of template

![Images of the creation process](images/image1.jpg)
Microtia: Stage I
Rib harvesting
# 69 Beaver Blade

Floating 9th Rib

Synchondrosis between 7th and 8th Ribs
Microtia: Stage II
Lobule Transposition
Microtia: Stage III
Postauricular skin grafting
Atresia repair: Surgical stages

- **Approach**
  - Lateral work
  - External auditory canal
  - Atretic plate
- **Reconstruction**
  - Middle ear
    - Ossiculoplasty
  - Tympanic membrane
    - Skin graft
  - External auditory canal
    - Skin graft
  - External auditory meatus
  - Tragus

Atresia repair: Surgical technique

- **Approach**
  - Tragal incision
  - Postauricular approach
  - Lateral EAC
  - Periosteal incisions
  - Harvest fascia
  - Expose cortex/cribiform
  - Expose glenoid

- Adequate excision of soft tissue
- Kenalog injection intraoperatively
- Put on some relaxing music
Atresia repair: Identifying the middle ear

Atresia repair: Ossiculoplasty
Atresia repair: Tympanic membrane

Atresia repair: Skin graft

- Donor site
  - Contralateral ear
  - Groin; primary closure
- Size
  - The bigger the better
  - About 7 x 3 cm ellipse
  - Excise one corner to graft TM
- Create tube
  - Interrupted and running sutures
  - 6-0 chromic on spatulated needle (TG140-8)
  - Invert tube
Atresia repair: Skin graft to TM

Atresia repair: Skin graft to EAC
**Atresia repair: Outcomes**

<table>
<thead>
<tr>
<th>Complication</th>
<th>Prevention</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAM collapse</td>
<td>Steroid injection, Packing, Adequate excision of soft tissue</td>
<td></td>
</tr>
<tr>
<td>EAC stenosis</td>
<td>Steroid injection</td>
<td>Steroid injection</td>
</tr>
<tr>
<td>EAC ectasia</td>
<td>Position pinna during closure</td>
<td>Revision</td>
</tr>
<tr>
<td>Fistula</td>
<td>Layered closure of postauricular incision</td>
<td>Layered closure</td>
</tr>
<tr>
<td>TM lateralization</td>
<td>Creation of sulcus, Tuck fascia graft</td>
<td>Revision if associated with CHL</td>
</tr>
</tbody>
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Atresia repair: Complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>Prevention</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent CHL</td>
<td>Candidacy</td>
<td>Revision surgery</td>
</tr>
<tr>
<td></td>
<td>All of the above</td>
<td>Amplification</td>
</tr>
<tr>
<td></td>
<td>CT scan in room</td>
<td>BAHA</td>
</tr>
<tr>
<td></td>
<td>Ossiculoplasty</td>
<td></td>
</tr>
<tr>
<td>Mucosalization</td>
<td>Careful positioning of skin grafts</td>
<td>Silver nitrate</td>
</tr>
<tr>
<td></td>
<td>Epithelial approximation</td>
<td>Gentian violet</td>
</tr>
<tr>
<td>SNHL</td>
<td>Don’t drill on plate</td>
<td></td>
</tr>
<tr>
<td>Facial palsy</td>
<td>Facial nerve monitor</td>
<td>A whole other topic</td>
</tr>
<tr>
<td></td>
<td>Low threshold to terminate the procedure</td>
<td></td>
</tr>
</tbody>
</table>

Improving outcomes with atresia repair

Pre op
- Patient selection
- Manage expectations (patient, family, and surgeon)

Operative
- Schedule adequate time in OR
- Meticulous surgical technique
- Approximation of epithelium

Post op
- Activity limitations

*Embrace the details!!*
Microtia and aural atresia

- Family education starts in infancy
- Manage expectations
- Surgical challenges
- Rewarding outcomes

Case presentations
Severe class 2 microtia
Severe class 2 microtia

Traumatic avulsion
Traumatic avulsion
Lobule reconstruction

Lobule reconstruction
Lobule reconstruction

Lobule reconstruction
Cryptotia