Microtia Ear Surgery and Bone Anchored Hearing Devices

Dr. Sheryl Lewin
Craniofacial and Pediatric Plastic Surgery
My (Non-Traditional) Path

- Architect/Artist
- Plastic Surgeon
- Craniofacial Surgeon
- Microtia Surgeon
- Bone Anchored Devices
My (Non-Traditional) Path

PLASTIC SURGEON

VS.

OTOLARYNGOLOGIST (ENT)
Treatment of Microtia & Atresia

Microtia Options

- No treatment
- Prosthesis
- Surgery

Hearing Options

- No treatment
- Bone Anchored Hearing Devices
- Canal Surgery (Atresia Repair)
MICROTIA

Micro = Small
Otia = Ear
MICROTIA Facts

The cause of microtia is unknown:
Genetic vs. Environment
MICROTIA Facts

- Microtia means “little ear”
- 1 in 2,500 to 12,000 babies
- boys > girls
- right > left
- Bilateral microtia: 7 - 22%
- >90% of patients with Microtia & Atresia have a conductive hearing loss
MICROTIA Facts

Treacher-Collins Syndrome

Hemifacial microsomia

Goldenhar Syndrome (OAV)
All ears are not the same
All MICROTIA ears are not the same
Microtia Grading System

**Grade 1**
Small but almost normal

**Grade 2**
Some recognizable anatomy

**Grade 3**
Small rudiment of soft tissue and no ear canal

**Grade 4**
No external ear and no ear canal
The Nature of Ear Reconstruction

- Complex 3-dimensional structure
- Structural support + soft tissue coverage
- High degree of technical difficulty

Complex Issues

- Psychosocial concerns
- Hearing Restoration (bone anchored device, canal)
MICROTIA OPTIONS

- No Treatment
- Prosthesis
  - Adhesive Retained Prosthesis
  - Implant Retained Prosthesis
- Surgery
  - Rib Cartilage
  - Medpor
Normal

Rib Cartilage

Medpor

Prosthetic

Normal

Normal
Ear Prosthesis

- Implant Retained (requires surgery)
- Adhesive Retained (attached with glue)
Ear Prosthesis

Advantages

- Realistic appearance
- No scars on other parts of the body
- Especially good for failed ear surgery
- The adhesive prosthesis does NOT require surgery
Ear Prosthesis
Ear Prosthesis
Ear Prosthesis
Ear Prosthesis
Ear Prosthesis

Warning!

Removing the microtia remnant
Can limit future reconstructive options
Ear Prosthesis

Disadvantages

- Even with the surgical abutment, the ear can still fall off
- Outcome depends on the skills of the anaplastologist
- Must be removed daily
- Will only last 2-5 years
- Difficult to match skin tones
- Infections and wound healing issues
- Requires a daily cleaning regimen
Rib Cartilage Ear Surgery

- Traditional method for > 50 years
- Uses the patient’s Rib Cartilage to make the structure of the ear
- The Rib Framework is placed inside a “skin pocket” under the scalp
- Uses ONLY the patient’s own tissues
Rib Cartilage Ear Surgery

cartilage remnant

lobule remnant
Rib Cartilage Ear Surgery
Rib Cartilage Ear Surgery
Rib Cartilage Ear Surgery
Rib Cartilage Ear Surgery

6th and 7th ribs

8th rib
Rib Cartilage Ear Surgery

This technique creates a 2-dimensional structure.
It does not create a thin, delicate framework.
Rib Cartilage Ear Surgery
Native ear cartilage and rib cartilage are NOT the same

Thin, delicate and malleable VS. Thicker, brittle and hard
Rib Cartilage Ear Surgery

The rib cartilage framework is placed under a skin pocket. A drain is used to suction the skin down to the ear.
Rib Cartilage Ear Surgery

Before and after the 1st rib cartilage surgery
Rib Cartilage Ear Surgery

3 weeks after the 3rd surgery

Normal
ADVANTAGES

- Well-established safe technique
- Uses only the patient’s own tissue
- Very good results in experienced hands
- Durable over many years
Rib Cartilage Ear Surgery

DISADVANTAGES

- The results are **NOT AS REALISTIC** as I would like
- Surgery can’t be done until the child is **6 or older**, so the ribcage will be large enough to make an adult-sized ear.
- The surgery requires **INPATIENT HOSPITALIZATION**
- It can be **PAINFUL**, requiring pain pumps / epidurals
- It requires **MULTIPLE SURGERIES** (up to 4)
- Requires **TECHNICAL EXPERTISE** for consistent results
MY GOAL WITH MICROTIASURGERY

To create a REALISTIC appearing ear which is SYMMETRIC to the opposite side that can be reconstructed at a much YOUNGER AGE with FEWER SURGERIES in a LESS INVASIVE WAY with MINIMAL PAIN.
Medpor Ear Surgery

- A completely different technique than Rib Cartilage
- NOT a “plastic” Rib Framework
- Uses the patient’s own tissue “flap”
- Sits on top of the scalp, not tucked in a pocket
Medpor Ear Surgery

- Porous Polyethylene
- Light weight but strong (50% air)
- The body’s tissue integrates into the Medpor “pores”
How The Ear Grows

%Adult Sze

<table>
<thead>
<tr>
<th>Age</th>
<th>3 yrs</th>
<th>4 yrs</th>
<th>5 yrs</th>
<th>6 yrs</th>
<th>7 yrs</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>80%</td>
<td>83%</td>
<td>86%</td>
<td>88%</td>
<td>90%</td>
</tr>
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</table>
How The Ear Grows

% Adult Size

Age

0% 20% 40% 60% 80% 100%

3 yrs 4 yrs 5 yrs 6 yrs 7 yrs

3 year old = 80%

7 year old = 90%

80% 83% 86% 88% 90%
How The Ear Grows

Medpor

%Adult Size

Rib Cartilage

Age

Age

3 yrs 4 yrs 5 yrs 6 yrs 7 yrs

80% 83% 86% 88% 90%

0% 20% 40% 60% 100%
The Medpor Technique
(video)
Surgical Results with Medpor
Medpor Ear Surgery

ADVANTAGES

- More realistic results in MY OPINION
Medpor Ear Surgery

ADVANTAGES

- More realistic results in MY OPINION
Medpor Ear Surgery

ADVANTAGES
๏ Can create a symmetric ear in just ONE outpatient surgery
Medpor Ear Surgery

ADVANTAGES

- Can be done as young as 3 years of age
Medpor Ear Surgery

ADVANTAGES

- An excellent technique for adults
Medpor Ear Surgery

ADVANTAGES

- Minimal Pain
Medpor Ear Surgery

ADVANTAGES

- Minimal scars
Medpor Ear Surgery

DISADVANTAGES

- Medpor is a synthetic material
- The long term outcome is unknown (beyond 23 yrs)
- If the Medpor becomes exposed, it won’t heal the way a Rib Cartilage ear will heal
- Medpor surgery is technically very challenging
- Complications can be difficult to treat
Medpor Ear Surgery

COMPLICATIONS

- Bleeding
- Infection
- Exposure (hole) - NOT rejection
- Fracture
- Failure
Options for Aural Atresia

- If unilateral, may choose no treatment
- Bone Conduction Hearing Devices
- Atresia Repair to create a canal
Conductive Hearing Loss

- Hearing Loss of the outer and/or middle ear
- Bone Conduction is NORMAL
- Air Conduction is ABNORMAL
Bone Anchored Hearing Devices

- Converts sound into vibrations creating a DRIVING FORCE

Processor ➔ implant ➔ bone ➔ cochlea

- Bypasses the canal and middle ear
Bone Anchored Hearing Devices

ADVANTAGES
- Better sound conduction
- “Low Risk, High Reward”
- Allows for better sound localization

DISADVANTAGES
- Requires surgery
- Wound issues
- Appearance
# Bone Anchored Hearing Devices

## DIRECT DRIVE

The driving force (vibration) is in direct contact with the bone → Osseointegration

## SKIN DRIVE

The driving force (vibration) is on the skin, not in direct contact with the bone
## Bone Anchored Hearing Devices

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<th>SKIN DRIVE</th>
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<tr>
<td>This is the most direct and efficient route for bone conduction with the best fitting range.</td>
<td>There is a transmission loss of at least 10 dB as compared to the direct drive, which limits the fitting range comparatively.</td>
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</table>
Bone Anchored Hearing Devices

DIRECT DRIVE

- Transcutaneous implanted Transducer
- Percutaneous
  - Ponto & Baha Connect
- BCI* & Bonebridge*

* Not currently commercially available in the US

SKIN DRIVE

- Implanted Magnet
- Headband & Softband
- Baha Attract & Sophono

* Not currently commercially available in the US
Bone Anchored Hearing Devices

3 parts:

1. Titanium implant
2. Abutment
3. Sound Processor

Oticon Medical Ponto Plus
Bone Anchored Hearing Device

Percutaneous

Oticon Medical Ponto Plus
Bone Anchored Hearing Device

Transcutaneous Systems

Sophono Alpha 2

Cochlear Attract
When a Bone Anchored Hearing Device is combined with a 1\textsuperscript{st} stage Medpor Ear Reconstruction, I use a SCARLESS technique for both Percutaneous and Trancutaneous Systems.
Combined Medpor Ear Surgery and Bone Anchored Implant

Implant placement "sleeper"

Location of canal
Combined Medpor Ear Surgery and Bone Anchored Implant

- Implant placement "sleeper"
- Location of canal
Combined Medpor Ear Surgery and Bone Anchored Implant

Implant placement “sleeper”

Location of canal
Combined Medpor Ear Surgery and Bone Anchored Implant

Implant & Sleeper placed under scalp without any scar
In just 1 outpatient surgery, Patients can have a functional ear
AFTERCARE

Healing cap and petroleum gauze is placed around the abutment

Post-operative check at 7-10 days

Gentle daily cleaning

Processor can be used 2-3 months after surgery for percutaneous systems

Processor can be used 1 month after surgery for transcutaneous systems
IDEAL TIMING OF SURGERY & BONE ANCHORED DEVICES
When should the Bone Anchored device be placed?*

*child must be at least 5 years old
IDEAL TIMING OF SURGERY & BONE ANCHORED DEVICES

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Adhesive Retained Prosthesis: IT DOESN’T MATTER

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IDEAL TIMING OF SURGERY & BONE ANCHORED DEVICES
When should the Bone Anchored device be placed?*

Adhesive Retained Prosthesis: IT DOESN’T MATTER
Surgically Retained Prosthesis: AT THE SAME TIME

*child must be at least 5 years old
IDEAL TIMING OF SURGERY & BONE ANCHORED DEVICES

When should the Bone Anchored device be placed?*

Adhesive Retained Prosthesis: IT DOESN’T MATTER
Surgically Retained Prosthesis: AT THE SAME TIME
Rib Cartilage Surgery: AFTER the ear surgery

*child must be at least 5 years old
IDEAL TIMING OF SURGERY
&
BONE ANCHORED DEVICES
When should the Bone Anchored device be placed?*

Adhesive Retained Prosthesis: IT DOESN’T MATTER
Surgically Retained Prosthesis: AT THE SAME TIME
Rib Cartilage Surgery: AFTER the ear surgery
Medpor Surgery: AT THE SAME TIME (ideally) or AFTER

*child must be at least 5 years old
A non-profit organization that helps children born without ears thrive through

Education
Advocacy
Research
Surgery
Patients with failed ear reconstructions
slewin@lewinmd.com
www.MicrotiaEarSurgery.com

Thank You!