The Ponto System and Benefits of Percutaneous BAHS

Jaime Leigh Westbrook, Au.D.
International Audiological Trainer and Supporter
Oticon Medical, Denmark

June 2015

Agenda

- 0 – 5: Introduction
- 5 – 10: Brief BAHS Principles Review
- 10 – 15: History of BAHS
- 15 – 35: Summarizing Percutaneous BAHS research results
- 35 – 45: Counseling Tips
- 45 – 55: Surgical Considerations
- 55 – 60: Q & A

Learning Objectives

- After this course learners will be able to identify the different types of bone conduction hearing solutions.
- After this course learners will be able to describe the importance of high frequency amplification on language development.
- After this course learners will be able to describe the detrimental impact of skin drive systems on hearing performance.
Introduction

History of Oticon Medical

Bone Anchored Hearing System
Freedom of choice for superior hearing

- BAHS business division in Gothenburg, Sweden
- First commercial bone anchored launch in 2009
- Fast growing with over 25% of new patients choosing Ponto
- Superior sound quality – 2 out of 3 choose Ponto when given the choice
Ponto – How does it work?

• External sound processor

Abutment (6, 9, 12 or 14 mm long)
Implant (inn 4 mm long)
Osseointegration

Candidates

Conductive or Mixed Hearing Loss

- Sound processor provides the correct pathway for sound, skipping over issues in the outer and middle ear
- Average BC threshold up to 55 dB HL

Single-sided Deafness (SSD)

- Sound processor helps to lift the head shadow, allowing sounds to be heard in the working cochlea on the opposite side
- Good ear has normal or near-normal hearing

Perspective

History of BAHS
Bone conduction
Direct Drive vs Skin Drive systems

- There are two types of bone conduction devices:
  - Direct Drive devices send vibrations via direct route to bone
  - Skin Drive devices send vibrations through the skin to bone

- Softband and magnet solutions provide similar performance¹

Sounds are attenuated in skin drive solutions

- Physical facts with skin drive solutions:
  - There is 10-20 dB sound attenuation in mid to high frequency region²

- These devices have lower output in the mid to high frequency region.

Consequence of skin attenuation on speech phonemes

² Verstraeten et al (2008) Comparison of the audiologic results obtained with the bone-anchored hearing aid attached to the headband, the testband and to the 'snap' abutment. Otology & Neurotology 30: 70-75
The importance of high frequencies for children language development

Clinical study
• Purpose: Determine learning rate for words presented with 4 kHz and 9 kHz bandwidths
• Method: Five nonsense words, paired with 5 novel pictures
• Outcome: Children need 3 times as many trials with limited bandwidth to learn new words as compared to the children who listen to extended bandwidth.5

Percutaneous BAHS Research

Pediatric case; Maintaining normal language development

- Q score of 100 is normal.
- "Language development testing showed an accelerated improvement in speech development after implantation"6
The importance of providing amplification early in life

- Age at fitting of amplification is predictive for speech perception, speech production, and spoken language skills.  
- Auditory system development, and particularly development of speech perception, is guided by access to relevant acoustic and linguistic information early in life.

Emphasis on HF amplification for SSD patients

- The goal is to lift the head shadow effect:
  - The head shadow effect exists above 1500Hz, therefore only high frequencies need to be amplified
  - Amplifying the low frequencies might disturb the natural hearing of the contralateral ear, leading to poorer hearing in background noise

Emphasis on HF amplification for SSD patients

- More high frequency amplification is needed to compensate for transcranial attenuation.
Summary - Avoiding poor results for SSD patients

- Only direct drive solutions can amplify the needed frequencies.
- Fitting a skin drive solution to an SSD patient will most likely lead to very poor results.
- Thanks to the Feedback shield, Ponto can provide more high frequency amplification than any other bone conduction device, all without feedback.

Mixed hearing losses

- The need for amplification is high because:
  - The hearing loss in the cochlea needs to be compensated for
  - Additional amplification is needed in a softband / skin drive solution to compensate for the skin attenuation.
- Only a Power bone anchored hearing device can provide the needed amplification.

Mixed hearing losses

- The Power sound processor needs to have a very effective feedback management system, to ensure that:
  - The prescribed gain will not be limited by the feedback limit
  - The patients are not bothered by feedback.
- A Power sound processor is also needed in order to provide the patient with the possibility to turn up the volume.
What patients should know about Skin Drive versus Direct Drive BAHS

Support informed decisions!

- More options than ever for bone anchored hearing patients
- There are both benefits and limitations in the different solutions for the individual patient
  - Does the solution provide enough amplification / output?
  - Is it comfortable enough to wear for a full day?
  - Cosmetically, how does it compare?

Consequence of skin attenuation on speech phonemes
**Daily usage and comfort**

**Pont**
- Minimal physical sensation of the device
- Device stays attached to abutment
- Nothing prevents the user from wearing it during all waking hours

**Magnetic solution**
- A full third of patients experienced pain wearing the device
- High risk of retention issues
- Not comfortable to be worn during all waking hours

<table>
<thead>
<tr>
<th>Wearing a processor</th>
<th>Ponto</th>
<th>Magnetic solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage/hr</td>
<td>BAHS</td>
<td>Magnetic solution</td>
</tr>
<tr>
<td>&lt; 4 h</td>
<td>7%</td>
<td>52%</td>
</tr>
<tr>
<td>4 - 8 h</td>
<td>7%</td>
<td>38%</td>
</tr>
<tr>
<td>&gt; 8 h</td>
<td>90%</td>
<td>32%</td>
</tr>
</tbody>
</table>

**Cosmetic aspects**
- A surgery should be as minimally invasive as possible for less numbness and pain
- The tissue preservation BAHS surgery leaves just a small post as the only evidence of the procedure.
- Tissue preservation BAHS surgery is reversible.
- Cosmetic outcome matters the most when the processor is in use.

**Pediatric patients**
- Softband solution is the best and only choice before age of surgery to provide BAHS patients with amplification

It is important to secure the best access to high frequency input - via abutment - as soon as the child is old enough. Children also need to wear their device all day...

Development doesn’t stop!
Who are the candidates if sound matters?

- **Pediatrics** and adults
- Conductive and mixed
- Single-sided deafness

- **Ponto**
- Pediatrics and adults
- Conductive and mixed
- Single-sided deafness

- **Transcutaneous Magnet**
- Pediatrics and adults
- Conductive and mixed
- Single-sided deafness

- **Head band or soft band**
- Pediatrics before eligible for surgery
- Adults: testing or before surgery

* Above the age of 5 years
Wide Ponto Implant OptiGrip™ Geometry

Improved stability enables longer abutments

OptiGrip geometry
Designed for improved stability
Largest initial bone contact surface in the industry

Ponto supports Tissue Preservation Surgery

• OptiFit™ – Designed for Tissue preservation
  • OptiFit’s Ti surface is the best documented solution for tissue preservation^1
  • A smooth tissue interface without pockets and pathways for bacteria
  • FDA-cleared for tissue preservation surgery

Abutment

• The Ponto Abutment family

<table>
<thead>
<tr>
<th>Abutment size</th>
<th>Ponto 6 mm</th>
<th>Ponto 9 mm</th>
<th>Ponto 12 mm</th>
<th>Ponto 14 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural skin thickness</td>
<td>&lt; 3 mm</td>
<td>3–6 mm</td>
<td>&gt; 6 mm</td>
<td>&gt; 5 mm</td>
</tr>
</tbody>
</table>
Tissue Preservation Surgery

- Local anesthesia
- 10-20 min surgery
- Wound healing within 10 days
- Start using sound processor 3 weeks after surgery

Tissue Preservation Surgery Methods

- Abutment placed beside the incision line
  - (published by M. Hultcrantz)

- Abutment placed in the incision line

Tissue Preservation Surgery Outcomes

The surgery that makes a difference!

- Better cosmetics
- Less numbness and pain
- Quicker healing
- Minimal scar tissue
- Quicker surgery
- Fully reversible
Thank you for your time today!