BoneBridge: The Audiological Perspective

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In January 2013, NHS Tayside became the first Audiology department in the UK to issue the Vibrant BoneBridge— the first active bone conduction implant. NHS Tayside have been at the forefront of managing patients with BC implants. From early 2013 there have been fourteen others issued with a BoneBridge and more are being assessed and fitted.

A clear pathway exists for patients referred to the Implant service, including hearing assessments allowing suitability for the BoneBridge to be assessed via aided thresholds and speech testing. Once the patient has been implanted, the team will fit and verify the sound processor six weeks post surgery. Regular Implant user support groups provide patients with the opportunity to share experiences.

M.C: A 62 year old female patient presented with long standing bilateral conductive hearing loss. She previously tried various aids; none proved to be satisfactory. Her suitability for a BC Implant was assessed in July 2012. M.C underwent implant surgery in February 2013 and was issued with a Left BoneBridge sound processor in March 2013. M.C’s aided outcomes were excellent; average aided thresholds were 25dB, aided speech test indicated 100% speech recognition at 60dB and 97% at 50dB compared to 40% at 60dB and 0% at 50dB unaided. Her BoneBridge has greatly improved her hearing and quality of life.

This is just one example of the positive impact of the BoneBridge. The implant team at NHS Tayside are committed to taking an individualised approach to assessing candidacy and managing realistic expectations.
Learning Outcome

- Demonstrate how the BoneBridge has positively impacted on patients

- Demonstrate NHS Tayside's Implant pathway and protocol

- Discuss an individual case study regarding a patient whom was unable to wear conventional hearing aids
NHS Tayside

- Tayside Health Board was established in April 1974
- NHS Tayside encompasses areas of Angus, Dundee, North East Fife and Perth and Kinross.
- Has a combined population of 405,721

The main Audiology department is based in Kings Cross Heath and Community Hospital in Dundee
NHS Tayside’s Experience

- In January 2013, NHS Tayside became the first Audiology department in the UK to issue the Vibrant BoneBridge.
- From early 2013 there have been 14 others issued with a BoneBridge and more are being assessed and fitted.
What is the Bone Bridge

- **Consists of two main parts**
  - **Audio Sound Processor**
  - **The Bone Conduction Implant**
What is the Bone Bridge
The Bone Conduction Implant (BCI) is positioned completely under the intact skin and contains a magnet that holds the audio processor in place above the implant by means of magnetic attraction.

- Transition can be bent up to 90° horizontally and 30° vertically.

Key dimensions:

- Diameter: 15.8 mm
- Distance screws: 23.8 mm
- Depth BC-FMT: 8.7 mm
- Depth screws: 4 mm
The Amade Sound Processor

Amadé BB

- 16 band Digital Audio Processor
- 8 compression channels
- 3 programs, switchable with push button
- Directional microphone option
- Focus on speech signals
- Frequency range: 250 Hz – 8 000 Hz
- Battery: Zinc-air 675
The Patient’s Journey / Implant Pathway

- Referral from ENT
- Hearing Assessment and Functional Testing
- Two week Trial
- Review and Discussion with Audiology & ENT
- Surgery
- Review / Follow up
- On Going Support
- Order relevant Sound Processor
- Fitting and verification of the sound processor
An in depth, age appropriate hearing assessment is carried out using insert earphones with full masking.

- Pure Tone Audiometry at all frequencies including 3 and 6KHz
- Masked and Unmasked BC values at 0.5, 1, 2, 3 and 4KHz
- Other
  - Conditioned Play Audiometry etc

- Questionnaire
  - GHAB Part 1
Implant Assessment

- Functional testing such as Speech Audiometry
  - Using AB Word list
  - BKB word lists, Manchester word list/Toy Test can also be used
**Implant Assessment**

- Using a softband a Bone Conduction Device (BCD) is then programmed to the patient’s BC in situ results.
  - Aided hearing thresholds in the soundfield
  - Aided Speech testing in the soundfield
  - Significant Unilateral Hearing Loss
    - Sufficient masking is played in the non test side
- After the battery of tests are completed, the results are discussed with the patient and their candidacy is analysed.
Candidacy for VBB

- Audiological criteria for the Vibrant BoneBridge device. Bone Conduction values should not exceed 45dB.

- Audiological criteria for the Vibrant BoneBridge for SSD patients. Bone conduction values must be 20dB or better in the contralateral side.
The Patient’s Journey / Implant Pathway

1. Referral from ENT
2. Hearing Assessment and Functional Testing
3. Two week Trial
4. Review and Discussion with Audiology & ENT
5. Surgery
6. Review / Follow up
7. On Going Support
8. Order relevant Sound Processor
9. Fitting and verification of the sound processor
• A Trial/Demo Bone Conduction Device that is audiologically suitable for the patient should be chosen and tuned in according to patient’s requirements.

• A review appointment is arranged within 2 weeks to re-evaluate patient’s perceived benefit.

• If patient opts for surgery, ENT are notified and a consultation appointment is arranged for further discussion with the surgeon.
The Patient’s Journey / Implant Pathway

Referral from ENT

Hearing Assessment and Functional Testing

Two week Trial

Review and Discussion with Audiology & ENT

Surgery

Order relevant Sound Processor

Fitting and verification of the sound processor

Review / Follow up

On Going Support
ENT Considerations / Surgery

- Position of the FMT BCI
  - Sigmoid Sinus
  - Dura
  - EAC
The Patient’s Journey / Implant Pathway

1. Referral from ENT
2. Hearing Assessment and Functional Testing
3. Two week Trial
4. Surgery
5. Review and Discussion with Audiology & ENT
6. Review / Follow up
7. On Going Support
8. Fitting and verification of the sound processor

Order relevant Sound Processor
Which sound Processor to use

- VBB
  - Amade BB only
  - Left or Right
- Sound processor in four different colour to match hair colour
  - Black
  - Brown
  - Blonde
  - Grey
The Patient’s Journey / Implant Pathway

Referral from ENT

Hearing Assessment and Functional Testing

Two week Trial

Order relevant Sound Processor

Surgery

Fitting and verification of the sound processor

Review / Follow up

Review and Discussion with Audiology & ENT

On Going Support
Fitting and Verification of the Sound processor

- Usually occurs after six weeks after surgery
- All sound processors can be activated as soon as the swelling has reduced as Osseointegration is NOT required.
- Magnet strength checked and changed if required
- General comfort, management, insertion, manipulation and maintenance discussed and demonstrated
Tuning and verifying the sound processor

- Aided thresholds
- Aided Speech testing
- Fine Tune and adjustment
- General/subjective live voice
- Acclimatisation and realistic expectations are discussed in depth
Example page of Tuning a VBB
The Patient’s Journey / Implant Pathway

- Referral from ENT
- Hearing Assessment and Functional Testing
- Two week Trial
  - Review and Discussion with Audiology & ENT
- Surgery
  - Review / Follow up
- On Going Support
- Order relevant Sound Processor
  - Fitting and verification of the sound processor
Review / Follow up

- A follow up is arranged approx 6 weeks after initial switch on.
- Benefit and limitations of the sound processor is discussed
- Fine tune adjustments can be made
- Revision of general management
- Change of magnet if needed
- Addition of programme controls
  - Noise, Music etc
- Outcome questionnaire
  - GHAB Part 2
The Patient’s Journey / Implant Pathway

Referral from ENT

Hearing Assessment and Functional Testing

Two week Trial

Order relevant Sound Processor

Surgery

Review and Discussion with Audiology & ENT

Fitting and verification of the sound processor

Review / Follow up

On Going Support

On Going Support
On Going Support

- The patient is never discharged from Audiology
- Further follow up and adjustments
- Annual review
- Implant user Group every second Monday of every second month
Case Presentation – M.C
Case Presentation – M.C

- 62 year old female
- Longstanding Bilateral Conductive Hearing Loss
- Suffered from recurrent ear infections
- Tried various hearing aids however non of which where truly beneficial
- Referred from ENT in NHS Fife directly to ENT NHS Tayside
- Attended the Implant User Group
Case Presentation – M.C
Audiological Implant Assessment

Pure Tone Audiometry

S – Unaided Speech thresholds
A – Aided Speech with existing hearing aid
A2 – Aided Speech with BAHA on softband
Case Presentation – M.C

- Her suitability for a BC Implant was assessed in July 2012
- ENT Investigations regarding suitability and CT scans of temporal bones in September 2012
- Pre op planning in November 2012
- Underwent implant surgery in the left side in February 2013
- Six weeks later... March 2013 M.C was issued with a Left Amade BB sound processor
Case Presentation – M.C
Issue of Left Amade BB

- Aided hearing threshold and Aided speech testing verses unaided
Case Presentation – M.C
Issue of Left Amade BB

• M.C was happy with the sound quality.
• General management and maintenance was discussed
• Insertion of the sound processor was very good and M.C found it to be comfortable
  ○ A stronger (#4) was ordered
• Two Programmes
  ○ P1 – Normal
  ○ P2 - Noise
M.C was extremely happy with the sound processor and reported that she wore it all day every day.

- Improved Quality of Life

Worried that the processor may fall off

- Stronger magnet fitted

M.C felt the sound processor generally benefitted her however she did note that she slightly struggled to hear in the presence of BGN

- Not used Programme two yet.

No ear infections!!!

Aware of Implant User Group, Repair Service and Annual Review
Conclusion

- This is just one example of the positive impact of the BoneBridge. The implant team at NHS Tayside are committed to taking an individualised approach to assessing candidacy and managing realistic expectations alongside striving to minimise perceived disability and handicap due to an individual’s hearing loss.

- The role of an Audiologist is therefore key to ensuring that we not only conduct hearing assessments and assist in providing an amplification device but we support an individual through their journey to an improved quality of life.
Thank you!

Any Questions?