

# BINAURAL LISTENING OUTCOMES IN MULTI-TALKER BABBLE WITH THE MED-EI BONEBRIDGE



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## 1. Objectives

The Med-EI BONEBRIDGE is a fully implantable, active transcutaneous bone conduction device. It is suitable for conductive, mixed hearing loss and single sided deafness (SSD) where the pure tone average (PTA) bone conduction (BC) thresholds are 45dB HL or better (with air conduction of 20 dB HL or better in the contralateral ear in cases of SSD)<sup>[1]</sup>



Spatial listening is an important function that allows two ears to function simultaneously to determine location and sources of sound. Those with SSD or severe asymmetrical hearing loss become overly reliant on their better hearing ear in background noise which can result in increased cognitive load and social isolation. The BONEBRIDGE device aims to improve sound localisation by eliminating the head shadow effect.

We aimed to:

- assess the effectiveness of this device on speech discrimination in spatially separated complex noise for a subset of patients with SSD or severe asymmetrical hearing loss.
- report on intra and post operative complication rates.

## 2. Materials and Methods

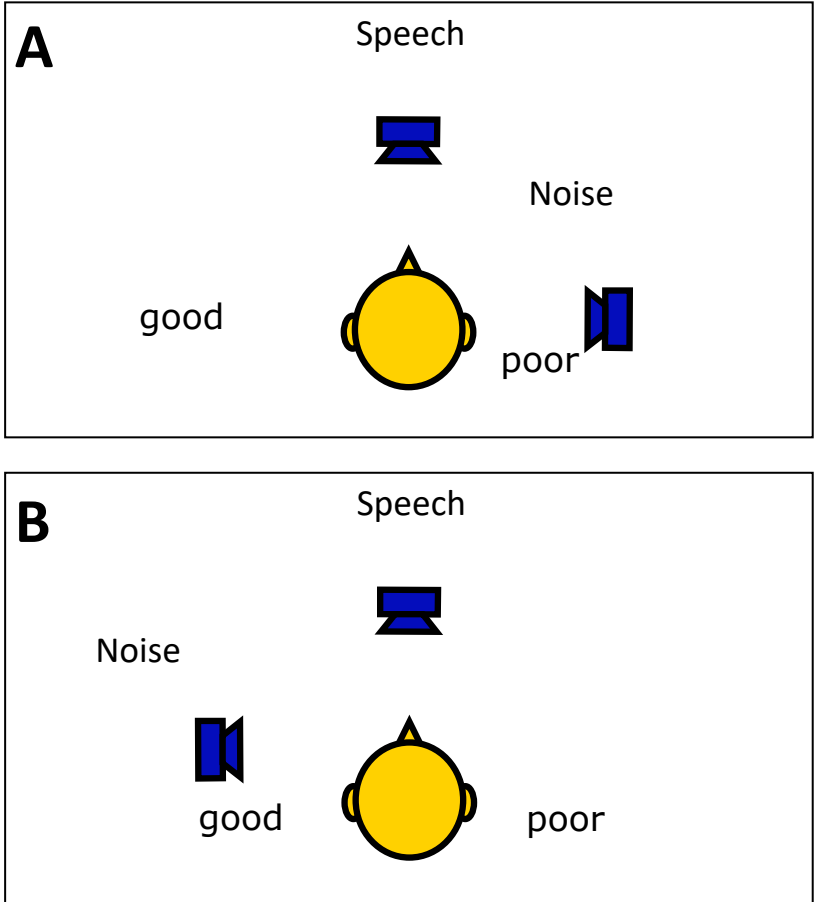
From prospective data 8 patients (5 male 3 female; age 22-59 years) with (SSD) or significant asymmetrical hearing loss were evaluated. Mean preoperative, unaided, pure tone average.

Hz	0.5	1	2	4
IMPLANTED dB	88.1	93.1	85	93.1
CONTRALATERAL dB	11.2	10	10.6	21.9

Each underwent spatial listening testing as part of their routine clinical care via the AB York Crescent of Sound apparatus.<sup>[2]</sup>



The AB York crescent of sound apparatus



The Bamford-Kowal-Bench sentences were presented from directly ahead (0 azimuth). Preoperatively multi-talker babble was presented to the 'poor' ear fitted with either a soft-band bone conduction aid or CROS aid. Testing was also performed to the 'good' ear. Similarly, postoperatively once established with the BONEBRIDGE to the 'poor' ear the tests were repeated. The Crescent of Sound software adapted the level of the noise to establish the signal to noise ratio (SNR) at which patients correctly repeated three keywords per sentence.

## 3. Results

- 8 patients were routinely tested on the AB York crescent of sound apparatus pre and post BONEBRIDGE implantation in their best aided condition.
- Paired T-tests were used to analyse the pre and post operative results.
- Pre operatively, the mean speech reception threshold (SRT) when babble was presented to their better hearing hearing was 1.80 dB SNR. This improved to -1.06 postoperatively.

Device use prior to implantation with BONEBRIDGE device

Pre op hearing device	Number of patients
CROS aid	3
Bone conductor on soft band	5

- This suggests that **post implantation patients, on average were able to repeat 3 keyword sentences when speech was 1.06 dB HL quieter than noise**, compared to their preoperative aided condition when; on average, they required speech to be 1.80 dB HL louder than noise.
- The difference in mean speech reception threshold (SRT) between the better hearing ear and the ear to be implanted (bad ear) Preoperatively was **4.93 dB SNR** (p <0.01)
- This difference persisted postoperatively but reduced to **2.57 dB SNR** (p <0.05)

Mean speech reception threshold in the best aided condition pre and post BONEBRIDGE implant

	PRE OP	POST OP
BABBLE TO GOOD EAR (dB SNR)	1.80	-1.06
BABBLE TO BAD EAR (dB SNR)	-3.13	-3.63

- Intraoperatively only 1 minor adverse event was noted (1 case of bleeding from emissary veins)
- Two patients reported magnet discomfort post implantation which resolved on adjustment of magnet strength.

## 4. Conclusion

- This study suggests that spatial listening in complex noise improves in patients with SSD or significant asymmetrical hearing loss, implanted with the Med-EI BONEBRIDGE device, when compared to their best aided preoperative condition.
- There were few intra or postoperative complications, which is in keeping with the published literature.<sup>[3,4]</sup>
- This study is limited by small numbers and further studies are required in assessing the effectiveness of the BONEBRIDGE device in improving spatial listening in those with SSD.

## References

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