A Semi-Implantable Active Bone Conduction Device For Single Sided Deafness, Conductive, And Mixed Hearing Loss: Performance And Quality Of Life At 12 Months

Julija Adamonis, Leah Smith, Ken Williams, Nils Gritters, Matthew G. Crowson, Euna A Hwang, Trung Le, Vincent Lin and Joseph Chen
Sunnybrook Health Sciences Centre, Toronto, ON, Canada

Objectives: The objective of this study was to prospectively assess speech and quality of life outcomes with an active, semi-implantable bone-conduction auditory prosthesis indicated for patients with conductive or mixed hearing loss (CMHL), as well as single-sided deafness (SSD).

Background: This device is a relatively recent alternative to bone-anchored or passive bone conduction systems like bone conduction headbands or contralateral routing of signal hearing aids. Our centre was the first in Canada to use this device as an alternative to the other devices.

Method: 49 patients, 31 CMHL and 18 SSD, were implanted with a transcutaneous active bone conduction device; ages ranged from 19 to 78, (mean age 48.8). All patients underwent preoperative testing including air and bone conduction audiometry in pure tone and speech, high resolution CT scanning and health related quality of life questionnaire assessment. Inter-aural attenuation measurements and the adaptive Hearing in Noise Test (HINT) with noise at 0, 90, and 270 degrees and speech at 0 degrees azimuth was also collected with the SSD patients. Follow up was performed at 1, 6 and 12-months post activation.

Results: Significant functional gain was demonstrated across all testing frequencies from 500 to 4,000 Hz in the CMHL group post-operatively, ps<.02. For SSD patients, there was a significant improvement ps<0.003 in aided thresholds which were obtained with the good ear plugged and muffed, but the mean signal-to-noise ratio on the HINT showed no significant differences when the device was compared on to off. Preoperative to 12-month post-operative HUI3 scores demonstrated significant improvement over time for CMHL group (ps<.001), but no significant improvement for the SSD group. Significant improvements were realized in all subsets of the SSQ (ps<0.001) for the CMHL group and the SSD group (p = .0.2). Mean tinnitus handicap measured by the THI revealed no differences preoperatively to 12 months postoperatively, and none of the patients who did not have tinnitus prior to implantation reported developing tinnitus post-operatively.

Conclusions: Results suggest that this active bone conduction device, while showing overall improvements in quality of life measures and functional gain for both SSD and CMHL patients, is truly only a preferred choice for CMHL patients as it does not improve signal-to-noise ratios for SSD patients. It remains a viable and promising option for those with the appropriate indications.