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Can the softband BAHA indicate the prospective improvement in hearing with middle ear implants?

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Learning Objectives: Middle ear implant surgery has a significant role in those who have suffered hearing loss due to cholesteatoma, either through the disease process or as a result of surgical clearance. Pre-operative planning is a key component in patient selection for middle ear implant surgery in hearing impairment. The objective of this study is to assess whether softband B.A.H.A. testing pre-operatively indicates the improvement achieved post-operatively. If so, we propose this is as an additional tool in pre-operative planning.

Method: The pre-operative aided half optimum speech recognition threshold (HOSRT) and post-operative aided results were compared for each ear that had undergone either Bonebridge (BB) or Vibrant SoundBridge (VSB) surgery in our centre. Pearson's correlation coefficient was calculated.

Results: Twenty-three implanted ears' (in twenty-two patients) data was assessed. The mean difference between pre-operative (assessment) and post-op (implanted) HOSRT was 8.27 dB. In 16/22 ears (72%) the difference was Pearson's correlation coefficient was 0.52, confirming moderate correlation.

Conclusion: These preliminary data assessment suggests that a BAHA softband is a potential tool to guide expectation of hearing augmentation outcomes with middle ear implant surgery. This data also suggests that results with the softband are not as good as final results with the implant, indicating patients may be counselled to expect equal, if not better, results with implant.

We propose that use of the BAHA softband has a 'predictive' role for pre-operative simulation of expected results, which is useful for patient selection, counselling and operative planning.

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Is there a Quality of Life (QOL) benefit from Bonebridge © or Vibrant Soundbridge © implants?

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Learning Objectives: Persistent conductive hearing loss in adults can occur for various reasons. It is a recognised consequence of cholesteatoma, and has a significant quality of life impact. Middle ear implantable hearing devices are a relatively novel aid for conductive hearing loss; the first Vibrant Soundbridge © (VSB) surgery was in 2006 and Bonebridge © (BB) in 2013. The objective benefit of improved hearing thresholds is well documented in the literature. This study assesses the more subjective quality of life (QOL) benefit of middle ear implants.

Method: All patients who have undergone VSB or BB surgery were requested to complete Glasgow Benefit Inventory (GBI) questionnaire after the device had been switched on.

The questionnaires were scored as per the GBI inventory scoring system.

Results: 15 out of 25 patients operated on (25 ears) completed the request, giving a return rate of 60%. Eight patients had Bonebridge © and seven had Vibrant Soundbridge © surgery.

The average calculated GBI total sub-score was 32.4, the average social GBI sub-score was 53.5, physical sub-score average was 57.2, and general sub-score was 70.8.

Conclusions: The authors propose that use of QOL assessment is an important component to be included in post-operative assessment alongside audiology assessment.

This case series has shown good QOL outcomes. The scores are equivalent to or better than published GBI scores for other comparable surgical hearing devices[i] . The benefit of middle ear implants is well supported by a combination of audiological and QOL improvement for patients.

[i] Arunachalam PS, Kilby D, Meikle D, Davison T, et al. (2001). Bone-anchored hearing aid quality of life assessed by Glasgow Benefit Inventory. *Laryngoscope* 111(7): 1260–3

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Evaluation of the Labyrinthine Operation Function in Ears with Acquired Cholesteatoma

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Learning Objectives: To evaluate the labyrinthine function of ears with cholesteatoma and observe differences between children and adults.

Introduction: Acquired cholesteatoma is an inflammatory condition of the middle ear that causes hearing loss and otorrhea. In our previous study, we had demonstrated that cholesteatoma may be associated to sensorineural hearing loss.

Because of the inner ear damage, we hypothesize that cholesteatoma may be also associated to posterior labyrinth alterations.

Methods: Transversal, descriptive and comparative study. We included consecutive patients with cholesteatoma and no previous ear surgery. As control group, we included patients with ears without any alterations and normal audiometric thresholds. The patients were submitted to an ENT evaluation, digital videotoscopy and a video Head Impulse Test (v-HIT), to detect peripheral vestibular deficits through an objective measure of the vestibular ocular reflex (VOR) gains.

Results: The research group was constituted by 72 ears and the control group by 62 ears. When we analyzed the semicircular canals (SCC) through the v-HIT, we observed that the average gain of the lateral SCC of the research group was significantly lower than the average of the control group ($p = 0{,}050$). Regarding the age of the research group, we found in pediatric population a gain of VOR in the anterior SCC significantly lower when compared to the average of ears with cholesteatoma in adults ($p = 0.037$). When we analyzed only the pediatric group, we observed that ears with cholesteatoma had VOR gain significantly lower than normal ears in posterior SCC ($p = 0{,}026$).

Conclusions: Ears with cholesteatoma demonstrated a lower average gain of VOR than the control group in the three SCC. Considering the age, pediatric patients with cholesteatoma had more alterations in the labyrinthine evaluation than those over 18 years.

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Tympanic membrane retraction and cholesteatoma: study of the pathogenesis through an analysis of the contralateral ear

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Learning Objectives: To investigate the cholesteatoma growth pattern and location of TM retraction in the CLE of patients with acquired middle ear cholesteatoma.

Introduction: Theories of acquired cholesteatoma pathogenesis involving previous tympanic membrane (TM) retraction are the most widely accepted. Since prospective studies are very difficult to perform, the study of the contralateral ear (CLE) in patients with cholesteatoma seems to be a good alternative to understand its pathogenesis. Our previous studies had demonstrated that TM retraction is the main alteration in the CLE of patients with cholesteatoma. We now propose to analyze these alterations in greater detail and correlate the observations with the cholesteatoma growth pattern in the main ear.

Methods: Our cross-sectional study included 242 consecutive patients diagnosed with posterior epitympanic (PEC) or posterior mesotympanic cholesteatoma (PMC) in at least one ear between August 2000 and March 2013. The patients had no surgical history. We performed videotoscopy in both ears and analyzed the videos independently in a blind manner. The prevalence of PEC and PMC and moderate-to-severe *pars tensa* and *flaccida* retractions in the CLE was evaluated. The observed alterations in the CLE were compared with the cholesteatoma growth patterns in the main ear.

Results: Cholesteatoma and TM retraction were observed in 17.8% and 42.6% of the CLEs, respectively. In instances where the primary ears displayed PEC or PMC, identical cholesteatoma growth pattern was observed in 89.5% and 64% of the CLEs, respectively ($p < 0.0001$). A similar phenomenon was observed in cases of *pars tensa* and *flaccida* retraction ($p < 0.0001$).

Conclusion: Patients with cholesteatoma have a greater probability of having both cholesteatoma and TM retraction at the same site in the CLE. Our findings validate the hypothesis that cholesteatoma pathogenesis is associated to previous TM retraction, with a high prevalence of bilaterality.

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Age-based differences in cholesteatoma in children

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Learning Objectives: To analyze the differences in the prevalence of cholesteatoma growth patterns between children below and over 12 years of age. We also aim to study the effect of age on the observed alterations in the CLE.

Introduction: Some controversy still exists about the pathogenesis of cholesteatoma in children. Classical definitions of congenital cholesteatoma are being debated and the study of cholesteatoma based on age can be useful in improving our knowledge of this disease.

Methods: In a cross-sectional study, videotoscopy data of 148 pediatric patients were analyzed for cholesteatoma growth patterns and contralateral ear (CLE) alterations. The children were divided into two groups: 1) Group 1 comprising 67 patients, under 12 years of age and 2) Group 2 comprising 81 patients, 12 years or older.

Results: We found that 6 out of the 7 patients with anterior epitympanic cholesteatoma (AEC) belonged to group 1. In group 1, 43.3% of the patients were posterior mesotympanic (PMC), 19.4% were posterior epitympanic (PEC), 17.9% had two patterns of cholesteatomas and in 19.7% patients