

are the treatment of choice in BPPV; however, 20% to 24.6% of patients are treated with betahistine. The aim of this study is to determine the evidence of betahistine treatment in BPPV.

Methods: Data source: MEDLINE, BMJ, Tripdatabase, DARE, and Cochrane. Revision methods: Guidelines, meta-analysis, systematic reviews, controlled and randomized studies, and observational studies published from 2008 to 2018 were searched using the following MeSH words: *benign, paroxysmal, positional, vertigo, and betahistine*. Strength of Recommendation Taxonomy (SORT) was used to quantify the levels of evidence and the strength of recommendation.

Results: In total, this review included 8 studies: 6 randomized controlled studies, 1 observational study, and 1 guideline. There seems to be no advantage in the use of betahistine before the repositioning maneuvers. The repositioning maneuvers are more effective than isolated betahistine medical treatment. Repositioning maneuvers followed by betahistine seem to be more effective with better and faster symptom improvement than other isolated therapies. This was particularly evident in the hypertensive population and in those with shorter duration of disease and shorter episodes of vertigo.

Conclusions: According to available evidence, repositioning maneuvers are the treatment of choice for BPPV, and betahistine may play a role in adjuvant treatment (Strength of Recommendation B).

The Role of the Oxidative Stress Pathway in Sudden Sensorineural Hearing Loss

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Objectives: The objective of this study was to evaluate the serum glutathione peroxidase (GPx) activity in patients with sudden sensorineural hearing loss.

Methods: A total of 30 consecutive patients who developed sudden sensorineural hearing loss were evaluated at our department between May 2017 and June 2018. Audiogram patterns were classified as ascending, flat, descending, concave, and convex. We used the American Academy of Otolaryngology–Head and Neck Surgery criteria for classifying auditory recovery. Before starting treatment with corticoid, we analyzed GPx enzyme activities and total cholesterol level in the serum.

Results: The mean age of the study population was 47.40 years. There was a slight female predominance with a ratio of 1.5:1. We observed a statistical difference in the GPx activity of the flat curve group compared with that of the ascending and descending curve groups. A negative correlation was observed between plasma GPx activity and total cholesterol level.

Conclusions: GPx enzyme has significantly lower activity levels in patients with sudden sensorineural hearing loss with

a higher total cholesterol level and a significantly lower expression of GPx activity in those individuals with descending type of audiogram. Therefore, we suggest that this antioxidant enzyme plays a critical role in the hearing recovery of these patients.

Round Window Reinforcement Is Effective Treatment for Superior Canal Dehiscence

Oliver Y. Chin, MD (Presenter); Rodney Diaz, MD

Hypothesis: Round window reinforcement (RWR) in the management superior semicircular canal dehiscence syndrome (SCDS) is a cost-effective therapeutic treatment for auditory and vestibular symptoms with low risk to hearing.

Methods: Study design: A single institutional retrospective case series is presented. Eleven patients underwent RWR in their treatment course for superior semicircular canal dehiscence from 2010 to 2017. Seven patients underwent primary RWR. All RWR procedures were performed in a similar fashion by the same surgeon using the transcanal approach using temporalis fascia. Review of available pre- and postoperative data was performed including demographics, physical examination, audiometric testing, vestibular testing, imaging studies, and operative records.

Results: Of the patients who underwent primary RWR, 6 patients reported benefit of sound-induced vertigo. Only 1 patient had no improvement in sound-induced vertigo (14%). None of the patients reported worse hearing postoperatively (0%). All patients were offered surgery under monitored anesthesia care as a same-day, outpatient procedure. No short-term or long-term adverse outcomes were encountered.

Conclusions: We found RWR performed with local anesthesia under monitored anesthesia care to be an effective and cost-conscious tool for long-term management of all symptoms of SCDS.

Sialometry as an Evaluation Tool for Iatrogenic Chorda Tympani Nerve Injury

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Objectives: Chorda tympani nerve (CTN) injury is a known complication of middle ear surgery; however, it is often overlooked because of its low incidence and relatively benign consequences. Emphasis has been placed on CTN's special sensory fibers providing taste sensation and the effects on taste perception after middle ear surgery. Nevertheless, injuries to the CTN also affect its parasympathetic fibers, which provide innervation to the salivary glands. So far, there is not much information about the effects of CTN injury on salivation. The objective of this prospective observational study is to determine the patient's baseline and stimulated saliva production preoperatively and after middle ear surgery.

Methods: Patients undergoing middle ear surgery had their resting saliva production measured preoperatively and 1 day postoperatively. Saliva measurements were performed in a

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fasting state in the same moment of the day; patients were asked to spit out all their saliva, then after 5 minutes, resting saliva was measured. Saliva production was stimulated by applying 10% citric acid on the patients' tongues and collecting their saliva 5 minutes after that.

Results: During surgery, it was documented whether CTN was stretched, sectioned, or intact. Saliva production was decreased in patients after undergoing middle ear surgery.

Conclusions: Although sometimes ignored, CTN manipulation during otologic surgery has an impact on saliva production.

Skull Vibration Induced Nystagmus Test: Topographic and Frequency Optimization

Christol Fabre (Presenter); Sebastien Schmerber, MD; Georges Dumas, MD

Objectives: To determine optimal parameters for the skull vibration test. Skull Vibration Induced Nystagmus (SVIN) is a recent, robust, and sensitive examination test that rapidly indicates vestibular function asymmetry.

Methods: SVIN horizontal component slow-phase velocity was analyzed in a population of unilateral vestibular loss (UVL) following the stimulus for these different locations: mastoid, upper and lower part of sternocleidomastoid muscle, upper and lower part of trapezius muscle (n=35 patients); and all that frequencies: 60, 100, 120, 150, 200 Hz (n=18). This retrospective study was conducted in a tertiary center from 2016 to 2017. Data were analyzed with a linear mixed model and a Tukey test to compare paired groups.

Results: Topography of stimulation: mastoid and upper trapezius muscles were similar ($P = .95$) and were the best locations to place the vibrator ($P < .05$). Frequency: 120- and 100-Hz stimulations did not differ significantly ($P = .95$) but were (higher) stronger than 60, 150, and 200 Hz ($P < .05$).

Conclusions: In UVL, SVIN optimal location is observed on the mastoid or in its close vicinity. Frequency: optimal responses are observed at 100 to 120 Hz.

Sleep Difficulty and Psychological Distress among Tinnitus Patients

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Objectives: To clarify the correlation between sleep and psychological complaints and tinnitus severity.

Methods: This cross-sectional study enrolled adult tinnitus patients who visited the otolaryngology departments in our hospitals from January 2017 to December 2018. Participants completed questionnaires including demography, Tinnitus-Handicap Inventory (THI), and Pittsburgh Sleep Quality Index (PSQI). The PSQI assessed sleep quality and disturbances retrospectively over the past month, and a subject with sleep difficulty was defined as scoring greater than 5. Hospital Anxiety and Depression Scale for Anxiety (HADS-A) and Depression (HADS-D) were evaluated for psychological

complaints. Among different levels of PSQI, the correlation between psychological symptoms and tinnitus severity was analyzed.

Results: A total of 1610 tinnitus patients (1105 male, 68.6%) with a mean age of 48.3 ± 14.3 years completed all questionnaires. The mean body mass index (BMI) was 27.8 ± 5.7 kg per m². The average THI score was 9.2 ± 19.4 , and 174 patients were reported to have moderate to severe tinnitus with THI scores ranging from 38 to 100 (10.8%). Overall, 1140 of all participants had sleep difficulty (70.8%). Significant risk factors of tinnitus severity included old age, higher PSQI, and higher HADS-A and HADS-D scores. For patients with sleep difficulty, positive correlations were found between adjusted THI and HADS-A ($R^2 = 0.070$, $P < .001$) and HADS-D ($R^2 = 0.034$, $P < .001$). However, such a correlation was not found in patients without sleep difficulty.

Conclusions: Anxiety and depression are associated with the severity of tinnitus, especially in patients with sleep difficulty. Management of sleep and psychological complaints is necessary for tinnitus sufferers.

Small Temporal Bone Dehiscences Are Associated with Otogenic Meningitis

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Objectives: To analyze a cohort of cases presenting with meningitis in the setting of temporal bone dehiscence. To assess the claim that temporal bone encephaloceles progress from bony dehiscence to herniation to meningitis.

Methods: This work was designed as a case-control study. Surgical repair of temporal bone dehiscence was recommended for 68 adults at our institution between January 2013 and December 2018. Within this cohort, patients presenting with meningitis were compared with an age- and sex-matched control group without meningitis. The size of dehiscence was assessed with computed tomography (CT) and magnetic resonance imaging; CT was preferentially used for measurement when available. Presence of a dural tear was ascertained via intraoperative evidence of a dural opening or preoperative suspicion for cerebrospinal fluid leak.

Results: The 9 cases of meningitis in our study were associated with temporal bone dehiscences between 1.1 and 5.2 mm (mean, 2.9 mm). These were smaller ($P < .005$) than the 23 dehiscences not associated with meningitis (mean 6.1 mm, range, 2.3-16 mm). Acute otitis media was more frequent in the meningitis group (71% vs 9%, $P < .005$), but dural tears were less frequent (44% vs 87%, $P < .05$). There was no statistically significant difference in body mass index, obstructive sleep apnea, pseudotumor cerebri, or encephalic herniation.

Conclusions: Otogenic meningitis from temporal bone dehiscence is associated with smaller dehiscences. Our data do not support the conclusion that the natural history of temporal bone encephaloceles is an orderly progression from bony dehiscence to herniation to meningitis.