

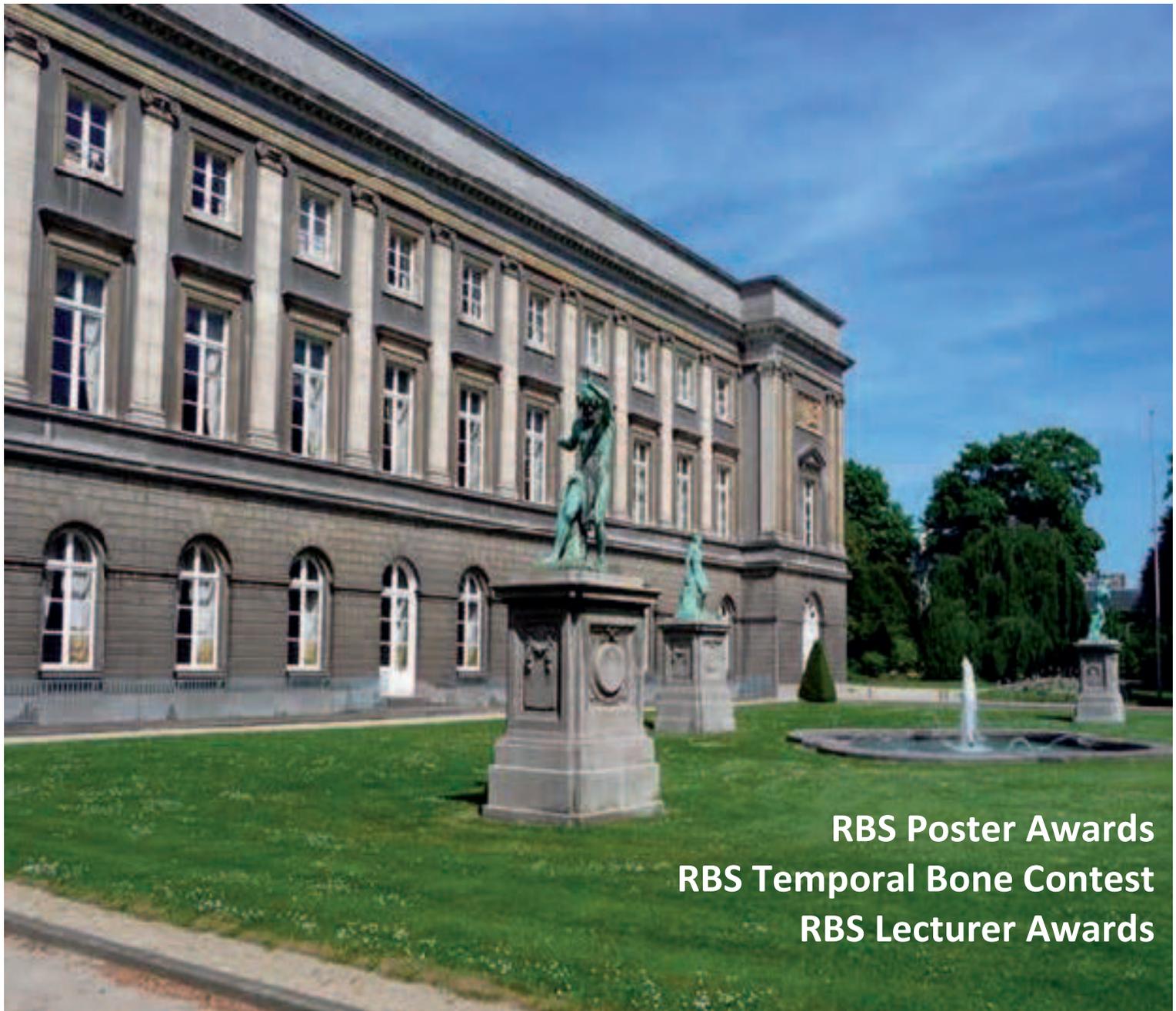
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**RBS Poster Awards
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RBS LECTURER AWARDS

Sound localisation in bilateral vestibulopathy patients

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Introduction and aim: Strong evidence exists that patients with bilateral vestibulopathy (BV) suffer from impaired spatial cognition. In general, spatial cognition has mainly been studied in situations with only visual cues, while the auditory component of the perceptual world is often neglected. However, auditory space perception is also a form of spatial cognition. Previous studies suggest that vestibular input is also necessary for sound localisation. These sound localisation tests have never been performed on BV patients, who are in fact the ideal study group. The aim of this study is to compare horizontal sound localisation skills of normal hearing BV patients and healthy controls.

Materials and methods: The test group consisted of 15 BV patients with an unaided bilateral pure tone average (PTA) of 500, 1000 and 2000Hz \leq 30 dB. The healthy control group consisted of 15 age-matched volunteers with an unaided bilateral PTA of 500, 1000 and 2000Hz \leq 30 dB. BV was diagnosed in accordance with the Bárány Society criteria: (1) reduced caloric response: sum of bithermal maximum slow phase velocity on each side $<$ 6°/sec. and/or (2) reduced horizontal angular vestibulo-ocular reflex (VOR) gain $<$ 0.1 upon sinusoidal stimulation on a rotatory chair and/or (3) reduced horizontal angular VOR gain $<$ 0.6 on both sides using video-head impulse test. Sound localisation skills were tested using seven loudspeakers in a frontal semicircle at subject head level, ranging from -90° to +90°. CCITT (Comite Consultatif International Telephonique et Telegraphique) noise bursts of 1 second duration were used and had randomly selected sound levels in the range 65–75 dB SPL. Sound location accuracy was analysed using the root-mean-square error (RMSE) and the mean absolute error (MAE).

Results: Both the age and hearing status were nearly the same in the BV patients and healthy controls, with respectively a mean age of 52.7 and 51.7 years and a mean PTH_{500, 1000 and 2000Hz} of 9.2 and 9.6 dB hearing loss. Only four BV patients made no errors, compared to thirteen of the healthy controls. The RMSE and MAE were significantly larger (worse) in the BV-group than in the healthy controls (p-value $<$ 0.05), with respectively a mean RMSE of 8.68 (range 0-16.59) and 0.97 (range 0-8.02), and a mean MAE of 2.76 (range 0-16.34) and 0.17 (range 0-1.42).

Conclusion: Most BV patients have difficulties localising sounds due to their hearing loss. But even those BV patients with preserved binaural hearing have worse sound localisation skills compared to age-matched healthy controls. Vestibular input seems to play a role not only in visual space perception but also in auditory space perception.

Electrocochleography as monitoring technique for structure and hearing preservation in cochlear implant surgery

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Introduction: Atraumatic electrode insertion during cochlear implantation (CI) gains importance as, with the relaxation of the criteria for reimbursement, more candidates with functional low-frequency residual hearing are referred for CI. Although soft surgery principles are considered, post-operative hearing decline may occur due to hair cell loss during electrode insertion or to postoperative mechanisms. Electrocochleography (ECoChG) pretends to be an adequate technique for monitoring the hair cell function during electrode insertion by continuous registration of the cochlear microphonics (CM).

Methods: Three patients with low-frequency pure-tone hearing thresholds better than 80 dB HL at 250 and 500 Hz were implanted with an Advanced Bionics (AB) Slim J electrode. During insertion the CM amplitude in response to an acoustic 500 Hz toneburst stimulus was continuously monitored with the Active Insertion Monitoring (AIM) system of AB. In addition, an electrode sweep was performed and ECoChG thresholds were measured. Post-operative pure-tone audiometric thresholds were determined after six weeks and three months. Hearing preservation was defined as less than 25 dB increase of the pure-tone average at 250, 500 and 1000 Hz from preoperative to postoperative audiograms.

Results: In patient 1, intraoperative CM monitoring demonstrated an increase in amplitude in the second half of the insertion, which remained stable, even after round window closing. In patients 2 and 3 a sudden increase in amplitude during the first half of the insertion was observed, immediately followed by a steep drop of the amplitude. Electrode sweep demonstrated a CM amplitude increase recorded on 4 apical electrodes in patient 1, but unexpected, difficult to interpret results in patients 2 and 3. Intraoperative ECoChG thresholds were not uniformly predictive for post-operative audiometric thresholds. Post-operative audiometry after 6 weeks showed hearing preservation in patient 3, and a mean low frequency threshold drop of 32 dB in patient 1 and 47 dB in patient 2.

Conclusion: Intra-operative CM amplitude monitoring with the AIM-system during electrode insertion is a promising technique to gather real-time feedback on the preservation of hair cell function. However, more experience with the AIM-system is needed in order to improve the prediction of the hearing preservation probability, and in order to counsel the surgeon to adapt the insertion act for minimizing the loss of hair cell function.

Children cortical processing of hierarchical linguistic structures in cocktail-party situation

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Introduction and aim: In cocktail-party situations, the adult brain tracks the attended speech temporal envelope at frequencies matching phrasal/sentential and syllabic rhythms. Recently, it has been demonstrated that children are able to track incoming speech at phrasal/sentential rhythm but that such tracking is more easily compromised by noise than in adults. Still, the phrasal/sentential rhythm also matches with prosodic stress rhythm, leaving it unclear if children's lower phrasal/sentential tracking of speech in noise relates to altered syntactic or prosodic tracking. To disentangle these possibilities, we assessed the effect of noise on the cortical tracking of prosody-free speech in adults and children.

Material and methods: Neuromagnetic activity was recorded from 20 adults and 20 children listening to blocks of French monosyllabic words. Words were either presented in random order (Scrambled) or in sentences sharing the same syntactic structure (Meaningful), and with or without added multi-talker background noise. Importantly, words were presented at equal loudness so that the Meaningful conditions came with no modulation in sound intensity at phrasal and sentential frequency. Spectral analysis was used to identify peaks of power at word, phrase and sentence frequency.

Results: In both groups, a clear peak of neuromagnetic power was disclosed at word frequency in all conditions. Neuromagnetic signals also tracked phrasal and sentential rhythmicity in Meaningful conditions (with and without noise). Interestingly, noise corrupted sentential tracking but not word or phrasal tracking. Overall, children responses were always weaker than adults one. However, the noise impacted sentential tracking in a similar way in children and adults.

Conclusions: Syntax-driven tracking of sentences is affected noise in situations where prosodic cues are absent. As adults and children responses are similarly affected by noise, these results suggest that the impact of noise on the cortical tracking of speech in children is probably imputable to altered perception of prosodic elements rather than syntactic content *per se*.

Impact of superior canal dehiscence syndrome on health utility values: a prospective case-control study

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Introduction and aim: Superior canal dehiscence syndrome (SCDS) was first described by Minor in 1998. It is a condition, characterized by a defect in the bone overlying the superior semicircular canal, creating a third mobile window into the inner ear. Patients can experience disabling symptoms and opt for surgical management. Limited data are available on the impact of SCDS on health-related quality of life (HRQoL) in general and health utility values more specifically. Health utility value are for example used to calculate quality adjusted life years (QALYs) and to determine cost-effectiveness of medical treatments. The aim of this study was to perform a prospective analysis on the health utility value in SCDS patients compared to healthy age-matched controls.

Material and methods: A prospective study was performed on patients diagnosed with SCDS at the Antwerp University Hospital, who did not undergo reconstructive surgery yet. Patients were recruited between November 2017 and January 2020 and asked to complete the Health Utility Index (HUI) Mark 2 (HUI2) / Mark 3 (HUI3) questionnaire. For the control group, age-matched participants without otovestibular pathology or other chronic pathology were recruited.

The multi-attribute utility function on dead-health scale for both HUI2 and HUI3 was calculated, and the results were categorized in to 4 categories of disability: none, mild, moderate, or severe. Results of both groups were compared using the Mann-Whitney U test.

Results: A total of 20 patients completed the questionnaire. Age ranged from 37 to 79 years with a mean age of 56 years (45% males and 55% females). The control group consisted also of 20 participants with a mean age of 56,4 and range from 37 to 82 (35% males and 65% females). There was a statistically significant difference for HUI2 ($p=0,002$) and HUI3 ($p=0,031$) multi-attribute utility function. SCDS patients had a worse HRQoL than age-matched healthy controls. One patient with bilateral SCDS had a negative HUI 3 multi-attribute score (-0,07), indicating a health-state worse than death.

Conclusions: SCDS patients have significantly lower health utility values than an age-matched control group. This confirms the negative impact of SCDS on HRQoL, even when using an instrument that is not designed to be pathology-specific but to assess health state in general. These data can be useful to compare impact on HRQoL among diseases.

Deep learning-based otoscopic profilometry: a new optical technique to quantitatively measure human eardrum deformation in-vivo, in 3D and in real-time

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The 3D shape of the human eardrum plays a crucial role in the process of sound transmission and any structural change to its topography is an important indicator for existing or impending middle ear pathology and subsequent hearing loss. Recently, we have embedded a multi-phase structural light projection engine into a customized portable otoscope. The device was able to measure small deformations of a cadaveric human eardrum in the laboratory environment. We have demonstrated that middle ear cavity pressure can be quantitatively measured by observing the volumetric displacement of the eardrum by measuring it from the outside ear canal. In a next-generation prototype of the 3D otoscope, we have replaced the multi-phase profilometry technique with a new single-shot, deep learning-based algorithm. This greatly reduced the complexity of the optical engine and allowed for a more robust and ergonomic design without synchronization hardware. By measuring eardrum displacement in living patients whilst middle ear cavity pressure-equalizing maneuvers are performed, the non-invasive 3D-otoscope can aid in the objective diagnosis of a number of middle-ear related pathologies such as chronic middle ear inflammation, Eustachian tube dysfunctioning and emerging retraction pockets.

Tinnitus brain: a functional reorganization?

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Introduction and aim: Tinnitus is an auditory phantom perception in the absence of any corresponding acoustic stimulus. Although this disease affects 25% of adult population, tinnitus remains poorly understood. Tinnitus seems to be produced by the brain related to auditory deafferentation. Functionally, the brain can be considered as a complex adaptative system who is able to evolve with a changing environment. Applying concepts from graph theory, the brain at rest can be characterized by a small-world topology both at the level of anatomical as well as functional connectivity. There is increasing evidence that tinnitus is associated with modifications of small-world structure which means that the tinnitus brain functions differently than controls.

Material and methods: A sample of 47 subjects with tinnitus and 32 healthy control underwent resting state fMRI. A resting-state BOLD fMRI data were acquired with a 3.0 T MR scanner. After preprocessing, brain parcellation was applied and correlation matrices were obtained. Graph theory-based approaches were used to model the brain network and to obtain a graphical representation (collection of nodes denoting neural elements (ROIs) that are linked by edges representing functional connections). The topology of the brain graph can then be quantified by different graph metrics and compared between subjects with tinnitus and controls. We focused on two groups of measures: measures of network segregation (clustering coefficient and local efficiency) and measures of network integration (participation coefficient and global efficiency).

Results: We observed modifications of brain topology in tinnitus patients characterized by a reduction in the mean clustering coefficient and local efficiency indicating a reduced segregation of brain system in tinnitus. In addition to global network changes, we also observed alterations in the topology of specific brain regions (both auditory and non-auditory). Brain regions driving this reduced segregation will be discussed.

Conclusions: Our results provide evidences of modification of the topological properties of the tinnitus brain which deviates from the optimal small-world architecture. Several brain regions demonstrate significantly reduced functional segregation indicating a modification of brain network organization linked to the presence of the phantom sound.

Bilateral vestibulopathy has an impact on Health-related quality of life: a comparison between the general and disease-specific instruments EQ-5D-5L, HUI mark III and DHI

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Introduction and aim. Bilateral vestibulopathy (BV) is a chronic vestibular disorder, which leads to postural imbalance, gait unsteadiness and movement-induced oscillopsia. These symptoms lead to disability and socio-economic repercussions, affecting health-related quality of life (HRQoL). The aim of this study was to compare the performance of general HRQoL instruments to a disease-specific instrument in BV patients.

Material and methods. A prospective study was performed in the Antwerp University Hospital on patients diagnosed with BV according to the 2017 Bárány Society diagnostic criteria. The EuroQol-5D-5L (EQ-5D-5L), the Health Utilities Index Mark 3 (HUI-3) and Dizziness Handicap Index (DHI) questionnaires were used to assess general and disease-specific HRQoL, respectively. The association between the questionnaires was compared using a Pearson correlation coefficient. An independent t-test assessed the impact of hearing loss comparing the different questionnaires in groups of normal hearing (High Fletcher-index (HFI) <40dB of the best ear) and hearing loss (HFI \geq 40dB of the best ear).

Results. A total of 105 patients with bilateral vestibulopathy (N=105, male 53.3%, mean age 60 years; SD=14) were included, of which 93 completed all questionnaires. The mean utility scores for EQ-5D-5L (0.73; SD=0.23) and HUI-3 (0.50; SD=0.30) were calculated. The mean DHI score was 38.41 (SD=25.46). The Pearson correlation coefficient found a strong positive correlation for the EQ-5D-5L and HUI-3 ($r(92)=.694$, $p<.001$). In addition, a strong negative correlation was found for the DHI correlated to the EQ-5D-5L ($r(93)=-.671$, $p<0.001$), and to the HUI-3 ($r(98)=-.675$, $p<.001$). There was no statistically significant difference for the EQ-5D-5L between normal hearing (M=.74, SD=0.25) and hearing loss (M=.72, SD=.21); $t(94)=.31$, $p=.76$) and no statistically significant difference for the DHI between normal hearing (M=38.00, SD=24.90) and hearing loss (M=38.65, SD=25.97); $t(100)=-.12$, $p=.90$). A statistically significant difference for the HUI-3 between normal hearing (M=.63, SD=.29) and hearing loss (M=.43, SD=.29); $t(101)=3.27$, $p=0.001$) was observed.

Conclusion. Bilateral vestibulopathy has a significant impact on general HRQoL, as assessed by the EQ-5D-5L and HUI-3. Additionally, its impact was also confirmed on the disease-specific HRQoL instrument DHI. These results suggest that all questionnaires are adequate tools in measuring HRQoL in BV patients. In addition, hearing loss puts an extra burden on HRQoL, which is only detectable by the HUI-3.

Radiological evaluation of inner ear trauma after cochlear implantation and outcome in residual hearing

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Introduction and aim: Conebeam CT (CBCT) has emerged as an optimal and secure imaging device to visualize the position of the electrode array within the cochlear structures. Preservation of cochlear structures and residual hearing thresholds lead to better cochlear implant performance and therefore in recent years this concept has become a goal for surgeons. The aim of this study was to evaluate the frequency of inner ear trauma and its influence on auditory outcome.

Material and methods: This retrospective study analyzed a total number of 17 cochlear implants in 16 post-lingually adults with sensorineural hearing loss, 9 males and 7 females (42 to 75 years old). All subjects were tested with pure-tone audiometry before and after surgery. All the cochlear implants were inserted within the round window. CBCT was realized after surgery to evaluate the position of each electrode array. The study group was separated according to a recent proposed radiological grading for inner ear trauma. These CBCT findings were correlated with postoperative decrease of pure tone average at 250, 500, 1000, 2000 and 4000 Hz.

Results: Of the total of 17 cochlear implants, 7 were inserted with intact osseous spiral lamina (no trauma, grade 0) and 10 were inserted with abnormal bowed contour of the implant and abnormal elevation of the osseous spiral lamina (moderate trauma, grade 1). Therefore, in our series, there was no scalar translocation with migration of the electrode from scala tympani to scala vestibuli indicating fracture of the osseous spiral lamina (severe trauma, grade 3). There was a significant difference among no trauma patients and moderate trauma patients regarding decrease of pure tone average ($p = 0,0125$).

Conclusion: Round window insertion was a safe approach to avoid fracture of the osseous spiral lamina. CBCT gave optimal image quality to assess inner ear trauma with small radiation dose. Bowed contour of the implant and abnormal elevation of the osseous spiral lamina may negatively influence the residual hearing thresholds.

Percutaneous bone conduction devices and skin complications: is laser treatment a solution?

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Introduction: The most frequent complication of percutaneous bone conduction device (BCD) surgery is skin problems around the abutment (eg dermatitis). Multiple grading systems exist with multiple treatment options. However, there are also other specific issues like hair ingrowth and folliculitis which we want to address during this presentation.

Material and methods: A literature overview of skin problems and possible solutions based on grading scales was made. Second, specific problems such as hair overgrowth/ingrowth leading to recurrent infections will be discussed based on a case report from AZ Sint Jan Brugge-Oostende AV, Bruges and an alternative treatment is proposed by means of laser therapy.

Conclusion: Treatment of a common complication such as dermatitis after BCD surgery is easily chosen due to a good grading of the dermatitis. Specific problems such as hair ingrowth require other specific treatments such as laser treatment.

Comparison of caloric and video-head impulse tests in Meniere's disease

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Introduction and aim: Meniere disease is defined by a disturbed vestibular function characterized by a dissociation of caloric (evaluating low frequencies) and video Head Impulse Test (v-HIT) (evaluating high frequencies).

Asymmetric caloric function in presence of normal horizontal v-HIT may function as a diagnostic marker.

However, a significant proportion of patients with a diagnosis of Meniere's disease have a decreased ipsilateral gain of vestibular ocular reflex (VOR).

The aim of this study was to evaluate the impact of phase (irritative vs parietic), stage and duration of disease on caloric tests and v-HIT results.

Materials and methods: We analysed retrospectively and compared the results of bithermal caloric and video-Head Impulse Test of ipsilateral horizontal canal in 28 patients with unilateral definite Meniere's disease (MD). Patients have been selected according to the 1995 AAO-HNS criteria. In this study, normal gain for v-HIT was set at $> 0,7$ to minimize false positive and increase the sensitivity of a dependent operator test. A normal caloric vestibular test was defined when canal paresis $\leq 20\%$. Different criteria were assessed: duration of disease in years, stage and phase of disease, presence of audiometric recruitment.

Results: In our study, 28 patients have been evaluated. A disturbed vestibular function in vHIT and calorics tests was present respectively in 4 patients (14,3%) and 18 patients (64,3 %).

The risk of a canal paresis in caloric tests in low stage I-II was 22,2% compared to 83,3% in high stage III-IV ($p= 0,002$). The risk of a reduced gain horizontal VOR in low stage I-II was 0% compared to 22,2% in high stage III-IV ($p=0,43$).

When using a cut-off value of 0,8, we also did not demonstrate a correlation between criteria evaluated and the proportion of abnormal vHIT test results.

Conclusions: There's a statistically significant association between vestibular function at low frequencies and the stage of MD. This association has been not proven at high frequencies.

No correlation could be highlighted between the results of these two tests.

Treatment of sudden sensorineural hearing loss with oral steroids and hyperbaric oxygen therapy: outcome of a prospective audit

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Introduction and aim: Sudden sensorineural hearing loss (SSNHL) is a common health condition, defined as a hearing loss greater than 30 dB over three consecutive frequencies, that has a sudden onset of ≤ 72 hours. Many treatment options have been suggested, but clinical practice guidelines only endorse the options of hyperbaric oxygen therapy (HBOT) and/or steroid therapy. This study aims to prospectively evaluate short-term hearing outcome after oral steroid therapy combined with HBOT.

Material and methods: A prospective audit including 126 patients between April 2018 and September 2019. All patients were treated with a tapered oral steroid regimen (1 mg/kg body weight) and 10 sessions of HBOT. Pre- and post-treatment hearing grades were recorded using the modified Siegel's criteria: grade 1, hearing threshold under 25 dB; grade 2, hearing threshold 26-45 dB; grade 3, hearing threshold 46-70 dB; grade 4, hearing threshold 71-90 dB; grade 5, hearing threshold over 90 dB. Hearing recovery outcomes were classified as complete recovery (CR), partial recovery (PR), slight improvement (SI), no improvement (NI) and non-serviceable ears (NS). Statistical analysis was performed using SPSS 26 for Windows (SPSS Inc. Chicago, IL).

Results: Eighty-four patients with SSNHL of at least grade 2 had a follow-up control shortly after finishing treatment. There was a follow-up control 1 month after treatment in 44 of these cases and 3 months after treatment in 47 cases. Treatment delay ranged from 0 to 115 days after onset with a mean value of 11 days. Hearing improvement (CR + PR + SI) was seen in 81% of patients and CR in 68% of patients. Paradoxically, patients with pre-treatment hearing loss grade 5 had the highest improvement rate of 100%. This improvement in hearing levels was not significantly associated with pre-treatment hearing grades or treatment delay.

Conclusions: Managing SSNHL with a combination of oral steroids and HBOT resulted in a significant short-term hearing recovery.

Progression of hearing loss and criterion for cochlear implant (CI) indication

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Introduction and aim: The Belgian criteria for reimbursement of cochlear implant (CI) implantation are evaluated with respect to the rate of progression of hearing loss and the relation between aided speech understanding in quiet and unaided pure-tone hearing loss.

Material and methods: Pure-tone hearing loss was analyzed in a retrospective longitudinal study, including 35 patients with moderate to severe hearing losses who received a CI and have been followed audiometrically for a period of on the average 10 years before implantation. The different averaged-threshold reimbursement criteria for cochlear implantation – mid-frequency and high-frequency Fletcher Index (FI and FI-high) – were evaluated in function of progression of hearing loss. The relation between aided speech understanding in quiet and unaided pure-tone hearing loss was determined from cross-sectional audiometric data of 72 adult hearing-aid users (143 ears).

Results: The rate of progression of hearing loss in the studied population was 3,7 dB per year. Averaged over the study group, the difference FI-high minus FI equals to 8,1 dB for the best ear. The relation between pure-tone hearing loss and aided speech understanding from this Belgian, Dutch-speaking population is very close to German data of Hoppe et al. The observed sigmoid behavior has a midpoint (50% monosyllabic word score at 65 dB SPL) near a pure-tone hearing loss of 60 dB HL (4-frequency-averaged Fletcher index), where speech understanding outcome is most uncertain.

Conclusions: Considering the calculated average rate of 3,7 dB of progression of hearing loss and the differences between FI and FI-high, the time of progression of hearing loss from the FI-high equal to 85 dB HL to FI equal to 85 dB HL will be approximately 2 years. Also, a substantial proportion of the hearing-aid users are expected to have inferior aided speech understanding for several years before reaching the 85 dB pure-tone hearing-loss criterion.

Attitudes of potential participants towards potential gene therapy trials in dfna9: a hypothetical scenario methodology

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Introduction and aim: Advances in gene and molecular therapeutic approaches to treat sensorineural hearing loss (SNHL) confront us with future challenges of translating these animal studies into clinical trials. Although restoring hearing up to a certain level has become mainstream because of cochlear implantation, little is known on patient attitudes towards preventing, stabilizing or slowing down progression of SNHL by means of future innovative therapies. This study aimed to better understand the willingness of patients with progressive SNHL and vestibular function loss of autosomal dominant (AD) inheritance to participate in potential gene therapy trials to prevent, stabilize or slow down hearing loss.

Material and methods: A survey was performed in carriers of the P51S and G88E pathogenic variant in the *COCH* gene (DFNA9). Various hypothetical scenarios were presented while using a Likert scale to study willingness to participate in potential innovative therapies.

Results: A total of 53 participants were included, incl. 49 symptomatic patients, 1 pre-symptomatic pathogenic variant carrier and 3 participants at risk (hearing loss and positive family history, but no genetic confirmation). Their attitude towards potential trials studying innovative therapies was overall affirmative, even if the treatment would only halt or slow down the decline of hearing and vestibular function, rather than cure the disease. Among the different potential scenarios, the less invasive and less frequent treatments increased the likelihood to enroll. Daily oral medication and annual intravenous infusion were awarded the highest scores. The more invasive, more frequent and more at-risk treatments were still likely to be accepted but decreased the willingness to participate. The presence of a placebo arm was met with the lowest scores of willingness to participate.

Conclusions: Overall, most symptomatic DFNA9 patients would likely consider participation in future innovative inner ear therapy trials, even if it would only slow down the decline of hearing and vestibular function. However, they were less unequivocal on high-risk treatments or a placebo-controlled study design. These data can be used to inform the recruitment and consent process into future innovative treatments to treat AD non-syndromic SNHL.

Relationship between the three-dimensional video head impulse test and MR/CT imaging in DFNA9 patients

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Introduction and aim: DFNA9 is caused by a variety of autosomal dominant mutations in the *COCH*-gene. The phenotype of the p.P51S mutation is characterized by progressive sensorineural hearing loss and vestibular deterioration. It's associated with focal sclerosis and narrowing of at least one semi-circular canal (SCC) on MRI and CT, which seems to correlate with decreased vestibular function in carriers with advanced hearing loss eligible for cochlear implantation. To date, no functional correlation between the 3 SCC and corresponding lesions on imaging have been reported. Our aims are to correlate 3D video head impulse test (vHIT) with CT and MRI lesions and to examine to which extent a second lecture of radiological data would match the first one in a series of p.P51S carriers.

Materials and methods: Thirty p.P51S carriers with available MRI and/or CT were identified. All imaging data were obtained after reassessment by two independent neuroradiologist in addition to the first lecture in a clinical setting. Subsequently, 18 subjects were selected of whom both data from 3D vHIT as well as imaging were available within a time interval of less than 24 months. Correlation between 3D vHIT and corresponding radiological SCC abnormalities were analysed using the Mann–Whitney U test.

Results: Overall, 92% of the ears presented MRI lesions on at least 1 SCC, whereas this was 75% on CT. No lesions were observed in 12.5%. The PSCC is the most frequently affected SCC on MRI as well as on CT. Second lecture led to 9 additional lesions on MRI and 16 lesions on CT. Furthermore, the median gain of the 3 SCC on vHIT test was significantly lower in subjects with positive CT (0.3215; $P = 0.0122$) and positive MRI results (0.3215; $P = 0.0134$).

Conclusions: A significant correlation was observed in DFNA9 patients between the presence of MRI or CT lesions at any SCC on one hand, and lower gain of any of the investigated SCC on vHIT on the other hand. The substantially larger number of lesions observed during scientific assessment, stresses the need to fully inform radiologists concerning the differential diagnosis to facilitate accurate diagnosis when planning imaging. These positive imaging findings in p.P51S patients are an apparent biomarker of advanced stages of vestibular deterioration in general.

Investigating the role of the Coch protein in the inner ear

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Introduction and aim: Hearing impairment is becoming more and more frequent and has a significant impact on the quality of life and health. One of the disorders leading to otovestibular impairment is DFNA9. This is an autosomal dominant disorder that leads to adult-onset progressive SNHL and deafness. DFNA9 is caused by mutations in the *COCH* gene encoding the Cochlin protein. Cochlin is a major ECM component of the inner ear where it has been reported to assist in structural support, sound processing and maintenance of balance within the inner ear. It is expressed in the spiral ligament and spiral limbus of the inner ear and is believed to play an important role in keeping the ion homeostasis in the endolymph of the mammalian cochlea but the exact function of cochlin is not yet completely understood. Cochlin also plays a role in immune reactions. A recent study has shown that *Coch* knockout mice have no immune reaction after a bacterial infection with *Pseudomonas aeruginosa*. In this study we assess the vestibular and hearing function of *Coch* knockout mice and their wildtype littermates over time to study the role of the *Coch* protein in hearing and vestibular function.

Materials and methods: In this ongoing study we included 39 *Coch*^{+/+}CBACa.129S1(Cg)-*Coch*^{tm1.1Stw}/Mmjax (*Coch* wildtype) and 31 *Coch*^{-/-}CBACa.129S1(Cg)-*Coch*^{tm1.1Stw}/Mmjax (*Coch* knockout) mice that will be assessed for hearing and vestibular function on different time points (at 6 months, 1 year, and from this time on, every 3 months). In addition to a forced swim test, vestibular testing is performed by using the vestibular deficit index, which evaluates circling, retropulsion and head bobbing, as well as the tail lift reflex, righting reflex and air-righting reflex. To assess hearing function Auditory Brainstem Responses and Distortion Product Otoacoustic Emissions were used.

Results: Intermediate results from data of 11 wildtype mice and 12 *Coch* knockout mice showed that after one year the ABR thresholds of the *Coch* knockout mice were significantly elevated compared to their wildtype littermates. However, so far no difference in vestibular function has been observed between the two groups.

Conclusion: Auditory and vestibular testing up to the age of 1 year shows that *Coch* knockout mice develop hearing impairment starting at one year, but vestibular function remains intact.

Validation of the Flemish version of the Vestibular Disorders Activities of Daily Living Scale (VADL-scale) in patients with dizziness

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Introduction and aim: Patients who suffer from dizziness or imbalance can experience functional impairment and/or difficulties in performing the activities of daily living (ADL). The VADL-scale evaluates the effects on self-perceived disablement in performing the daily routine activities in patients with vestibular disorders. This study aims to validate a Flemish version of the VADL scale and to examine the impact of dizziness and instability on the daily functioning and quality of life (QOL).

Material and methods: Patients with dizziness and/or imbalance were included from the outpatient clinic of a tertiary care center and compared to a healthy control group. The subjects were assessed using the VADL, Dizziness Handicap Inventory (DHI) and EQ-5D-5L questionnaires to evaluate daily life activities, disease-specific health-related quality of life and health utility respectively. Internal consistency of this questionnaire was evaluated using Cronbach's alpha coefficient. Correlations between questionnaires were calculated with the Spearman's rank correlation coefficient.

Results: Fifty-two subjects were included (25 females and 27 males, 30 patients and 22 healthy controls) in the study with a mean age of 56.35 (range 22-83) years. There was an excellent internal consistency ($\alpha = .986$) of the Flemish version of the VADL- questionnaire. The VADL median total score in the patient group was 75 (Interquartile Range (IQR): 43.00-117.25) compared to 28 (IQR: 28.00-30.00) in the control group. The DHI median total score in the patient group was 45 (IQR: 43.00-117.25) compared to 0 (IQR: .00-2.00) in the control group. The EQ5D-5L median total score in the patient group was .68 (IQR: .56-.75) compared to 1.00 (IQR: .87-1.00) in the control group. Results of the Spearman correlation indicated that there was a very strong positive association between the VADL scale and the DHI ($r_s[51] = .86, p < .001$). There was a strong negative correlation between the VADL and the EQ5D-5L ($r_s[51] = .67, p < .001$).

Conclusions: The Flemish version of the VADL scale has an excellent internal consistency. There were good correlations between the VADL, DHI and EQ-5D-5L which can illustrate the impact on dizziness on the QOL. There was a trend towards lower health utility values on the VADL scale in case of significant impact on daily life activities.

Hearing Results in 151 Stapedotomies for primary otosclerosis and analysis of factors affecting outcome

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Objective: To evaluate long-term hearing results of primary stapedotomy for otosclerosis and analyse the influence of patient-, disease-, and procedure-related variables.

Study design: Retrospective case series.

Setting: Tertiary referral center.

Patients :151 ears (patients aged 18 to 74) underwent stapedotomy for otosclerosis with stapes fixation between May 2008 and June 2018. They were operated on by the same surgeon with the same technique. They had early postoperative follow-up (on average one month post-surgery) and 70 cases had late postoperative follow-up (on average 2 years post-surgery).

Intervention: Stapedotomy procedure for otosclerosis with CO2 laser and reconstruction with a Fisch piston.

Main outcome measures: Preoperative and postoperative audiometric evaluation using conventional audiometry. We calculated the thresholds, on pure tone audiometry, at frequencies of 0.5, 1, 2, and 4 kHz in both air conduction (AC) and bone conduction (BC) as well as the air-bone gap (ABG). Speech reception threshold (SRT) and word recognition score of 100% (WRS) were also assessed pre- and postoperatively, using the French Fournier's disyllabic words list. Postoperative air-bone gap ≤ 10 dB was considered as excellent outcome. Preoperative, early postoperative and late postoperative hearing results were compared. Influence of patient- and procedure-related variables on hearing outcome was evaluated.

Results: The postoperative air-bone gap was 10 dB or less in 35.4% of cases early post-surgery and in 46.4 of cases in long-term follow-up. Air-bone gap closure within 20 dB was obtained in 91.2 and 97.1%, respectively. Pre-operative factors like the importance of the ABG, the age, the presence of tinnitus or vertigo doesn't influence the surgical outcome.

Regarding the peroperative factors such as the incus anatomy, the facial nerve anatomy and the importance of the bleeding, the number of laser shots, we haven't found any predictive factors of bad results. The distance between the footplate and long process of the incus hasn't been measured in 41 patients. A piston with a length of 4.75mm has been used in 146 patients. There is no statistically difference on the hearing outcome in patients where we haven't made the measures peroperatively and used a 4.75mm length piston. We registered a risk of 14.8% to develop tinnitus postoperatively. On the other hand, 61.1% of the patients reported complete resolution of tinnitus. The preoperative and postoperative average ABG, SRT and WRS values were not related to the postoperative tinnitus. The bone conduction at 4000Hz isn't affected by the number of laser shots. Finally, patients have reported taste disturbance at 6 months postoperatively in 13.2% of cases. There is more risk of dysgeusia in patients where the chorda tympani nerve was sectioned (41.1%) than patients where this nerve remained intact (14.2%) or was stretched (23%).

Conclusion Our series confirms good hearing results achieved in stapedotomy surgery with CO2 laser, also in long-term follow-up. No patient-, disease-, or procedure-related variables were identified as predictors of surgical success. Stapes surgery is also effective for the treatment of tinnitus. Finally, the state of the chorda tympani nerve doesn't predict the presence of taste disturbance post-operatively.

Impact of caloric testing for the diagnosis of vestibular migraine

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Aim: Vestibular migraine (VM) has been identified as the most frequent cause of recurrent vertigo attack. Nevertheless, VM remains underdiagnosed. Based on the hypothesis that migraine may be caused by sensory hypersensitivity, we investigated whether VM patients show vestibular hyperactive response to caloric irrigation to help for the diagnosis of VM.

Material and method: We performed a retrospective comparative study of patients seen in a tertiary referral hospital between 2011 and 2018. 100 patients diagnosed with vestibular migraine were compared with 30 controls. The diagnosis of VM was based on the diagnosis criteria of the consensus of the Barany Society for Neuro-otology and the International Headache Society (2012). The diagnosis was confirmed by a neurologist examination and normal imaging of the posterior fossa structures when required. We compared the two groups' summed caloric responses from cool and warm water stimuli of the patient's both ears .

Results: The VM group was composed of 84% of women and the control group of 59% of women. The average age of the VM group at the time of examination was 44 years old and 50 years old for the control group. The VM group exhibits higher caloric response values, with a mean of 169 degrees per second, which was statistically significant when compared to the values for the control group with a mean of 86 degrees per second ($p < 0,0001$). 5% of the VM patients presented enhanced discomfort and emesis which forced us to interrupt the examination before the end of its completion. Our results indicate that VM patients present hyper-responsivity to caloric stimulation resulting in some cases in a lower tolerance to the completion of the examination.

Conclusions: Vestibular hyperreactivity to caloric testing is a feature of vestibular migraine. In addition to patient history and complete oto-neurological examination, overall canal response to caloric stimulation could be used for the diagnosis of VM.

The dizzy patient on the road: assessing driving performance in bilateral vestibulopathy patients

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Introduction and aim: Bilateral vestibulopathy (BV) is a chronic vestibular disorder which leads to postural imbalance, gait unsteadiness and movement-induced oscillopsia. These symptoms increase in case of an uneven surface or in darkness, which may consequently lead to driving difficulties. The aim of this study was to analyze self-reported driving behavior by means of a validated questionnaire as well as an instrument specifically designed to assess situations relevant to BV.

Materials and methods: In this study, we included BV patients according to the Barany criteria. Evaluation was performed using 3 questionnaires to assess self-reported driving skills. The questionnaires include two validated questionnaires looking at general driving behavior: the Driver Behaviour Questionnaire (DBQ) and the Multidimensional Driving Style Inventory (MDSI). The DBQ evaluates aberrant driving behaviour. On the other hand, in the MDSI the driving behaviour is typed in a specific style of driving. Additionally, a questionnaire was designed with questions about the specific driving situations that may affect BV patients, next to a visual analogue scale (VAS) evaluating self-reported driving performance and a question about car accidents and traffic violations in the past three years.

Results: We included 10 BV patients of which 5 were male patients and 5 female. The mean age was 57,5 (ranging 47-67) years. The DBQ identified less adapted driving behavior, incl. driving too fast on the motorway and driving until the end before joining another traffic line (“ritsen”). Mean VAS for self-reported driving performance was 4,6/10. Challenging situations included driving on cobble stones or uneven surface (mean VAS 4,2/10), driving in the dark (mean VAS 5,6/10) or bad weather conditions (mean VAS 5,2/10), lights of oncoming traffic (mean VAS 4,4/10), and while talking to a passenger (mean VAS 4,6/10). None of the patients reported car accidents in the past three years.

Conclusions: Patients with bilateral vestibulopathy do report difficulties while driving. Currently there are no objective measurements to evaluate the driving ability in vestibular patients. Hence, further research is needed to develop practical guidelines to counsel vestibular patients about their driving (dis)ability.

Unilateral hearing loss in children: acceptance of hearing aids

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Introduction and aim : Amongst children with congenital deafness, about one third presents a unilateral hearing loss (UHL). Although these children are capable of performing well in the pre-school setting with respect to speech and language development, multiple recent studies show that academic and psychosocial obstacles are often encountered later on, justifying the need for early hearing aid (HA) provision. We aim to investigate the acceptance of HA in these children.

Material and methods: Monocentric retrospective study including children diagnosed in our Department with congenital severe to profound UHL of sensorineural or conductive origin between 2010 and 2019. Several parameters were collected for each child: age at diagnosis, aetiology, presence of co-morbidities, age at HA trial, type of HA tested, daily wearing time, acceptance and reasons for non-acceptance. Two types of HA were tested: Contra-lateral Routing Of Signal (CROS) or Bone-Anchored Hearing Aid (BAHA), either Softband or Adhear.

Results: Forty children were included in this study, amongst whom 15 presented a severe to profound sensorineural deafness mostly due to cochlear nerve aplasia, and 25 presented a moderate to severe conductive hearing loss mostly due to isolated ear aplasia. The highest level of HA acceptance was for CROS (50%), followed by Softband (35%) and Adhear (33%). The non-acceptance was either due to discomfort (40% of the children, particularly in case of Softband), insufficient benefit perceived by the child and/or the parents (30%), financial burden (24%) or aesthetic concern (14%).

Conclusion: Our study shows a high level of non-acceptance of hearing aids by children and/or parents in case of congenital unilateral hearing loss, mainly due to discomfort. Design improvements could help to increase their acceptance and thereby reduce the risk of educational difficulties in these children.

Evaluation of the transmastoid plugging approach for superior semicircular canal dehiscences : a retrospective series of 28 ears

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Introduction and aim: Semicircular canal dehiscence is an inconsistent bony defect. It may be found in about 10 % of the temporal bones. The superior semicircular canal is mostly affected. The superior semicircular canal dehiscence syndrome (SSCDS) however is much less common. It may lead to a large variety of auditory and vestibular symptoms. High-resolution CT, or even better cone-beam CT, is essential for its localisation and evaluation of the extension of the dehiscence. The final diagnosis must be supported by clinical symptoms and functional testing. The treatment is either conservative or surgical and the latter is reserved for severely affected cases. The aim of this study is to report symptomatic and audiometric outcomes after the transmastoid plugging approach.

Material and methods: 26 patients (28 ears) presenting with SSCDS between 2007 and 2020 in two tertiary otology institutions were included in this retrospective study. All 26 patients suffered from severe auditory and vestibular symptoms and underwent a transmastoid plugging approach. Preoperative work-up consisted of tonal audiometric testing, cVEMP, VNG and radiologic evaluation by HR-CT or CB-CT. We recorded the evolution of the post-operative auditory and vestibular symptoms, the audiological data, the evaluation by cVEMP. As well as the occurrence of possible complications.

Results: A total of 26 cases with 28 interventions performed between 2007 and 2020 were included in this study. The mean age was 57 years (range: 34-84). 24 patients underwent a unilateral transmastoid plugging, two had bilateral surgery. Most patients had an improvement in vestibular symptoms, less presented with improved hearing. Audiometric data will be presented. Tullio's phenomenon was present in 15 patients (75 %) and a 77.78% improvement was found after surgery. 85.7% of the patients had preoperative autophony and a reduction of symptoms after surgery was found in 88.8% of the cases. cVEMPs were performed in 16 patients after surgery and were improved in 75%. We had no postoperative total sensorineural hearing loss and no facial palsy.

Conclusions: Transmastoid plugging approach is an effective and safe procedure and can be regarded as a valuable alternative to the more wide-spread middle cranial fossa approach.

Treatment of invalidating tinnitus: our experience within the Audiophonology Center, CHU Mont-Godinne, Belgium

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Introduction and aim: Tinnitus is a frequent complain in our ENT daily consultation. When they are invalidating they could be very difficult to care. The aim of this study was to evaluate the impact of a multidisciplinary approach in the treatment of this invalidating tinnitus.

Material and methods: Since 2010, patients with invalidating tinnitus (TQ score $>40/82$) are supported by a pluridisciplinary team (ENT, audiologist, psychologist) in our Audiophonology Center. All patients benefited therapy including TRT counselling, hearing aids adaptation (white noise generator, usual amplification or a combination) and psychological support. The benefit of this multidisciplinary treatment was evaluate according to the TQ score particularly.

Results: Between January 2010 and June 2018, 105 patients were enrolled, 67 males and 38 females, aged from 19 to 78 (average 51 years old). 10 patients left before the end of the treatment, one passed away. So 94 patients completed their therapy. The average duration of the therapy was 8 months. The medium TQ score was 56/84 before the therapy and 36/84 after the treatment making a gain of 20 points (statistically significative $p < 0,005$).

Conclusion: A multidisciplinary approach in the treatment of invalidating tinnitus allows a significant reduction of the tinnitus impact on the patient quality of life.

Recurrence of cholesteatoma after tympanoplasty with an endoscopic control

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Introduction and aim: Cholesteatoma is one of the most frequent conditions encountered by the otologist. The treatment for this pathology is surgical and various surgical techniques have been described. Recently, endoscope-assisted ear surgery has become increasingly popular because of the detailed visualization of the middle ear cavity and of the temporal bone's hidden anatomic areas. The first objective of this article is to assess the recurrence of cholesteatoma after an endoscope-assisted ear surgery. The second objective is to appraise the correspondence between MRI results and clinical examination findings during recurrence of the disease.

Material and methods: This study was conducted retrospectively. For this study, we collected data from patients who were surgically treated by Dr. Levie between 2008 and 2019. No individual involved has been personally contacted.

Result: Patients who have a positive perioperative endoscopy are older than those who don't have a positive endoscopy. When the endoscopy is positive, there is less recurrence than when the endoscopy is negative. MRI and clinical findings seem to correlate poorly.

Conclusion: For now, perioperative endoscopic examination during cholesteatoma surgery does not show more efficiency than the microscopical approach in terms of recidivism of the disease. However, if the perioperative endoscopy is positive, chances of recurrence are lower. Regarding the correlation between MRI and clinical examination findings, our study shows a poor match and a second-look surgery can sometimes be a better option.

Chondrolaryngoplasty for transgender patients: feasibility of a scar-free approach

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Introduction and aim: Adult Male-to-Female transgender patients with a prominent thyroid notch can benefit from chondrolaryngoplasty with high satisfaction rates. It is a safe, effective, and established procedure with only minor and temporary complications. Until now, only external approaches have been described, leaving the patient with a cervical scar, which remains a frequent complaint. The goal of this study is to assess the feasibility of a transvestibular endoscopic chondrolaryngoplasty.

Materials and methods: Transvestibular endoscopic chondrolaryngoplasty was conducted on six fresh adult male cadavers. Thyroid cartilage approach was similar to the one described in cases of transvestibular endoscopic thyroidectomy. After thyroid notch exposition, the laryngeal prominence was shaved down using an endoscopic burr until the desired result was achieved.

Results: Laryngeal prominence volume was significantly reduced without any cutaneous scar.

Conclusions: We have demonstrated that this novel approach is feasible and has the great benefit of leaving the patient free of any visible scar.

Thyroplasty type III to lower the vocal pitch in trans men

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Introduction and aim: About 20% of trans men don't achieve cisgender male normative frequencies ($F_0 \leq 131\text{Hz}$) after gender-affirming hormone treatment (GAHT) with testosterone. The surgical procedure Isshiki Thyroplasty Type III (TPIII) is described to lower F_0 , but data on this technique in trans men are lacking. The aim of this retrospective study was to examine the effect of TP III in trans men not satisfied with the fundamental frequency (F_0) of the voice after a minimum of 12 months of GAHT with testosterone.

Material and methods: Eight trans men, unsatisfied with their voice after a minimum of 12 months of GAHT with testosterone, underwent TPIII to lower F_0 at the department of head and neck surgery of the Ghent University Hospital. Pre- and postoperatively an acoustic evaluation of the voice took place.

Results: The F_0 dropped significantly from the preoperative mean of (154.60 +/- 12.294) Hz to the postoperative mean of (105.37 +/- 10.522) Hz ($t=9.821$, $P<0.001$).

Conclusions: TP III is effective for lowering the F_0 in trans men who are not satisfied with their voice after long-term testosterone GAHT.

Medialization thyroplasty: vocal outcome of silicone implants, titanium implants and polydimethylsiloxane elastomer injection

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Introduction and aim: Inadequate glottic closure due to unilateral vocal fold paralysis (UVFP) often results in chronic dysphonia and dysphagia. Different medialization thyroplasty techniques have been described. The aim of this retrospective study is to compare the functional outcome of laryngeal framework thyroplasty - Isshiki type 1, using either silicone (LFT-S) or titanium (LFT-T) implants and vocal fold augmentation using polydimethylsiloxane elastomer injection (VOX®).

Material and methods: Voice assessment data, including GRBASI-scale, maximum phonation time (MPT), Dysphonia Severity Index (DSI) and the Voice Handicap Index (VHI), of 15 patients treated with VOX®, 11 with LFT-S and 36 with LFT-T collected prior to medialization thyroplasty and 1-4 weeks postoperatively were analysed by means of Kruskal-Wallis test with post-hoc analysis. Additionally, comparison of hospitalization duration for all patients over all different treatment groups was conducted.

Results: Pre-postoperative comparison for the entire population showed significant ($p < .05$) improvement of all parameters, except for 'R' ('Roughness' on the GRBASI scale). Significant group differences were found for 'G' ('Grade'), MPT and hospitalization duration ($p < .05$). Improvement of 'G' was both in LFT-T and VOX® significantly greater than in LFT-S ($p < .05$). For MPT the improvement in LFT-S was significantly greater than improvement in LFT-T and VOX ($p < .05$). Hospitalization duration was significantly lower in VOX® group compared to both LFT groups ($p < .05$).

Conclusions: The entire study cohort showed overall improvement of vocal outcome, supporting the idea that medialization thyroplasty techniques are an effective treatment for UVFP dysphonia. For the majority of voice parameters there was no significant difference between the groups. However, there was a meaningful difference in hospitalization duration in favour of VOX®.

Perioperative antibiotics in clean-contaminated head and neck surgery: a systematic review and meta-analysis

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Introduction and aim: Patients undergoing major head and neck surgery, with exposure of the wound to the aerodigestive tract, are at risk of developing surgical site infections. Perioperative administration of an antibiotic agent significantly reduces the risk of postoperative infections. The optimal evidence-based prophylactic antibiotic regimen for surgical site infections following major head and neck surgery remains a matter of debate.

Material and methods: Medline, Cochrane and Embase databases were searched for the current best evidence. Retrieved manuscripts were screened according to the PRISMA-guidelines. Included studies dealt with patients >18 years that underwent clean-contaminated head and neck surgery (P) and compared the effect of an intervention, perioperative administration of different antibiotic regimens for a variable duration (I), with control groups receiving placebo, another antibiotic regimen, or the same antibiotic for a different postoperative duration (C), on surgical site infection rate as primary outcome (O) (PICO model). A systematic review was performed, and a selected group of trials investigating a similar research question was subjected to a random-effects model meta-analysis.

Results: Thirty-nine studies were included in the systematic review. Compared with placebo, cefazolin, ampicillin-sulbactam and amoxicillin-clavulanate were the most efficient agents. Benzylpenicillin and clindamycin were clearly less effective. Fifteen studies compared short- to long-term prophylaxis; treatment for >48 hours did not further reduce wound-infections. Meta-analysis of five clinical trials including 4336 patients, where clindamycin was compared with ampicillin-sulbactam, implied an increased infection rate for clindamycin-treated patients (OR= 2.73, 95% CI 1.50-4.97, p=0.001).

Conclusions: In clean-contaminated head and neck surgery, cefazolin, amoxicillin-clavulanate and ampicillin-sulbactam for 24 (to 48) hours after surgery, were associated with the highest prevention rate of surgical site infections. Administration of clindamycin increased the risk of infection in comparison to standard antibiotics and should therefore be avoided.

Psychophysical taste assessment: comparison between taste strips and cotton taste buds

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Introduction and aim: To develop a more practical test for screening of gustatory function in clinical setting, without losing the sensitivity of taste strips.

Material and methods: A total of 35 study participants (25 female and 10 male volunteers, with a mean age of 34y) were enrolled. All were tested with the following psychophysical taste assessments: the already established method 'taste strips' proposed by Kobal in 1997, the newly proposed cotton taste buds method and the cotton taste buds method with a preceding learning phase. For all different methods the same tastants and concentration steps were used: sweet (0.4, 0.2, 0.1, 0.05g/mL saccharose); sour (0.3, 0.165, 0.09, g/mL citric acid); salty (0.25, 0.1, 0.04, 0.016 g/mL) and bitter (0.006, 0.0024, 0.0009, 0.0004 g/mL quinine hydrochloride). GustaF algorithm was used as a tool for whole mouth testing in a PC-randomized sequence.

Results: The newly proposed cotton taste buds method showed significant higher scores, compared to the taste strips, both for total taste scores ($p < 0,001$), as for lateralized taste scores ($p < 0,001$). Analysis of variance revealed a significant difference in the number of taste confusions made in the different dilutions steps ($p < 0,001$) and a significant difference between the different taste confusions made ($p < 0,001$) in the taste strips testing method. These significant difference could not be found in the newly proposed cotton taste buds method. Statistically there was no difference between the cotton taste buds method, and the cotton taste buds method with preceding learning phase. All participants preferred the cotton taste buds method, and thought that the preceding learning phase could be useful in patients with dysgeusia.

Conclusions: Cotton taste buds seems a valid diagnostic tool for screening. Nevertheless, taste strips remains the golden standard for psychophysical taste assessment.

Validated prognostic nomograms for patients with parotid cancer predicting 2- and 5-year tumor-recurrence free interval probability

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Introduction and aim: Salivary gland malignancies are rare tumors with an heterogeneous histological and clinical appearance. This complicates clear prognostication. Previously, we identified multiple prognostic factors in patients with parotid cancer and developed prognostic indices which categorize patients into one of four subgroups with significantly different prognoses. These scores have repeatedly been validated internationally, demonstrating their general applicability and lasting relevance. Recently, nomograms gained popularity as a prognostic tool as they are user-friendly and their outcome is a more individualized estimate of prognosis.

Material and methods: Nomograms were constructed using the original dataset which was previously used to develop pre- and postoperative prognostic scores, PS1 and PS2 respectively.

Results: Pre- and postoperative nomograms predicting 2- and 5-year tumor-recurrence free survival probability are presented. All previously identified and validated, multivariately important prognostic factors, are incorporated (clinical T and N classification, pain, age at diagnosis, skin invasion, facial nerve dysfunction, perineural growth, and positive surgical margins). Concordance indices for PS1 and PS2 were previously estimated at 0.74 and 0.71, respectively, and are in line with other, widely accepted oncological nomograms.

Conclusions: The prognostic nomograms for predicting 2- and 5-year tumor-recurrence free survival probability in patients with parotid cancer are powerful, user-friendly, visual tools and are based on internationally validated prognostic indices. They allow for a reliable prognostic assessment, present a more individualized estimate of the risk for recurrence than the prognostic grouping based on PS1 and PS2. This can be used to assign trial-patients to risk groups, and may assist in therapeutic decision making and determining appropriate follow-up intervals in clinical practice.

Epiglottic collapse during drug-induced sleep endoscopy is associated with negative effort dependence

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Introduction and aim: The sites and patterns of upper airway collapse as observed during drug-induced sleep endoscopy (DISE) are a major outcome determinant of non-continuous positive airway pressure treatment in patients with obstructive sleep apnea (OSA). According to Genta et al. (CHEST, 2017), negative effort dependence (NED), defined as percentage reduction in inspiratory flow from peak to plateau, is associated with different upper airway collapse sites during natural sleep endoscopy. However, associations between NED and DISE collapse sites are currently lacking. Thus, the current study aimed to assess the feasibility of airflow measurements during DISE in order to calculate NED for different collapse sites.

Material and methods: Twenty patients with mild to moderate OSA underwent a standard clinical DISE expanded with polysomnography and calibrated pneumotachograph measurements. Sedation was induced by midazolam and maintained by propofol. Individual flow-limited breaths were scored by one observer based on a standardized scoring system. Only breaths with complete collapse ($\geq 90\%$ obstruction) were considered for further analyses. NED values were calculated from flow shape analyses according to Mann et al. (ERJ, 2019).

Results: Data from 19/20 patients were included for analysis. One patient was excluded due to an erroneous coupling of the endoscopic footage and individual breaths. In total, 1377 breaths with complete collapse and associated airflow were obtained. After applying Bonferroni corrections for multiple testing ($p < 0.01 = 0.05/5$), breaths associated with epiglottic collapse [median 0.70, IQR:(0.44-0.91)] showed significantly ($p < 0.0001$) higher NED compared to breaths associated with non-epiglottic collapse [median 0.47, IQR:(0.27-0.69)]. No significant differences in NED were found for other collapse sites.

Conclusion: This study demonstrates the feasibility and potential of concomitant airflow measurements during DISE. Our results are in line with previous findings from natural sleep endoscopy and emphasize the need for comparative research in flow shape analysis between DISE and natural sleep endoscopy.

Prevalence of obstructive sleep apnea in children with laryngomalacia and role of polysomnography in the treatment decision

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Introduction and aim: To investigate the prevalence of obstructive sleep apnea (OSA) in children with laryngomalacia and the role of polysomnography (PSG) in treatment decision.

Material and methods: Retrospective medical record review of infants with laryngomalacia confirmed by direct laryngoscopy during a 3 years period. Demographic data, presenting symptoms, severity classification, comorbidities and pre- and postoperative polysomnography data were retrieved and analyzed. Data are expressed as a median (25th-75th percentile).

Results: In total, 46 infants were diagnosed with laryngomalacia between March 2016 and April 2019. A complete data set was available for 44 patients, 24 males and 20 females. The median age at the time PSG was 12 weeks (6,3-29,8). Thirty-four infants (77,3%) were diagnosed with OSA. A diagnosis of OSA changed the severity classification and treatment decision in 21 (47,7%) cases. Twenty-three infants underwent supraglottoplasty, 7 infants underwent continuous positive airway pressure (CPAP) and 9 patients had both treatments. The obstructive apnea/hypopnea index decreased from 4.6/h (2,3-10,5) to 2.4/h (1,5-4,4) after supraglottoplasty (p=0,006).

Conclusions: A large number of infants with laryngomalacia presents with OSA. The presence of OSA may affect the severity classification of laryngomalacia and thus support the need for surgical treatment or CPAP therapy instead of watchful-waiting.

Tonsillar obstructive hypertrophy and recurrent tonsillitis in children: what is the role played by the tonsillar carriage of *Streptococcus pyogenes* ?

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Introduction and aim: *Streptococcus pyogenes* (Group A *Streptococcus*, GAS) is a human pathogen responsible for bacterial tonsillitis in children. It is also part of the commensal flora of the pharynx with ~20% of children carrying it asymptotically. We aim to investigate the potential role of GAS tonsillar carriage in chronic obstructive tonsillar hypertrophy and recurrent tonsillitis in children.

Material and methods: Monocentric prospective study including children undergoing tonsillectomy for either Obstructive Sleep Apnea Syndrome (OSAS) or recurrent tonsillitis. Microbiological throat swabs, superficial and deep tonsil fragments were collected during tonsillectomy and cultured for GAS. Multiple colonies were stored for each GAS-positive clinical sample. GAS strains were characterised by *emm*-typing and antimicrobial susceptibility to 5 antibiotics. The presence of GAS, the *emm*-type and the antibiotic susceptibility pattern were then compared inter-individually (OSAS vs recurrent tonsillitis) and intra-individually (tonsil surface vs superficial/deep tonsil crypts).

Results: Fifty-eight children were included (30 OSAS, 28 recurrent tonsillitis) and GAS was found in 32.8% of them. GAS was more frequently recovered in OSAS (40%) than in recurrent tonsillitis (25%). The culture of GAS carriers was always positive in every microbiological sample (tonsil surface, superficial and deep tonsil crypts). Ten different *emm*-types were identified amongst the cohort, with a preponderance of *emm*-type 1. No intra-individual diversity of *emm*-type was observed. On the contrary, 36.8% of the cases displayed intra-individual heterogeneity in their antibiotic profile, with some strains carrying antibiotic resistance genes amongst mostly sensitive strains.

Conclusion: The preliminary results of this ongoing study show a high GAS tonsillar carriage rate with a particularly high rate in OSAS, suggesting a potential role of GAS in this syndrome. About one third of GAS-positive cases shows a heterogeneity of antibiotic resistance profiles, making resistant strains difficult to detect but likely to be associated with clinical treatment failure. The bacterial virulence profile of these strains will be analysed to develop better prevention and/or treatment of chronic obstructive tonsillar hypertrophy and recurrent tonsillitis by specifically targeting their causal pathways.

Functional imaging using computational fluid dynamics improves patient selection for mandibular advancement device treatment outcome in sleep-disordered breathing: a prospective study

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Introduction and aim: Mandibular advancement devices (MAD) are a non-invasive treatment option for patients with obstructive sleep apnea (OSA) worn intraorally at night in order to increase the upper airway volume. However, the exact mechanism of action is not yet completely understood. The aim of this study is to link MAD treatment outcome to computational fluid dynamics (CFD) findings with and without MAD.

Material and methods: One hundred OSA patients were prospectively included and treated with a custom-made MAD at a fixed 75% protrusion. A low dose CT-scan was made with and without MAD for CFD analysis. CFD analyses were performed by FluidDa NV (Kontich, Belgium). Patients underwent follow-up polysomnography three months after therapy start-up to evaluate treatment efficacy. A reduction in apnea-hypopnea index (AHI) $\geq 50\%$ was considered as treatment response.

Results: Overall, 71 patients (baseline AHI median: 16.5 events/h, interquartile range: (10.4-23.6); oxygen desaturation index 4.4 events/h (2.2-11.3); body mass index (mean \pm standard deviation): 27.8 \pm 3.2kg/m²) completed both 3-month follow-up polysomnography and low dose CT-scan with CFD analysis. MAD treatment significantly reduced the AHI from 16.5(10.4-23.6) events/h to 9.1(3.9-16.4) events/h, $p < 0.001$. MAD treatment significantly increased total effective upper airway volume in all patients (8.6(5.4-12.8)cm³ vs. 10.7(6.4-15.4) cm³; $p = 0.003$), possibly related to an increase of velopharyngeal volume (2.1 (0.5-4.1)cm³ vs. 3.3 (1.8-6.0)cm³; $p < 0.001$). Analyses in responders and non-responders showed a significant increase in total effective upper airway volume with MAD in responders (without MAD: 8.3(5.7-11.5)cm³, with MAD: 11.0(5.4-15.3)cm³, $p = 0.0358$) whereas there was no significant increase in upper airway volume in non-responders (without MAD: 9.3(5.4-15.7)cm³, with MAD: 10.2(6.7-16.1)cm³, $p = 0.196$). Responders and non-responders did not significantly differ regarding baseline values.

Conclusions: MAD acts by increasing the total upper airway volume, and velopharyngeal volume. Responders showed a significant increase in total upper airway volume with MAD treatment while there was no significant increase in non-responders.

Coagulation of posterior crico-arytenoid muscle for abduction spasmodic dysphonia

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Background: Spasmodic dysphonia (SD) is a rare disorder primarily affecting females involving neurological dysfunctions. There are 3 classic types of SD ; adductor SD, abductor (ABSD) and mixed SD. Botox injection is the gold standard treatment for spasmodic dysphonia but due to the possible loss of efficacy over time, surgical options must be considered.

Case report: Our patient underwent a bilateral posterior crico-arytenoid muscle (PCA) coagulation by radiofrequency performed under general anesthesia. The Voice Handicap Index (VHI- 10) improved from 35/40 to 19/40. The patient was rated G2R3B2A1S2 according to GRABS scale.

Conclusion: This is the first report of a bilateral, endoscopic PCA muscle coagulation for treatment of refractory ABSD. This approach is a new option for surgical management of ABSD for patients for whom botulinium toxin injections have become inefficient or if the patients don't want to undergo recurrent interventions.

“A Historical vignette”. Deviance from the Protective function of the Larynx: concerning a historic and fatal case in the adult

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Following the brutal and dramatic death of the French poet Stéphane Mallarmé on the 9th of September 1898 at the age of 56, as a result of a laryngospasm, various aetiologies were considered. Even today, uncertainty prevails.

This paper deals with Yves Guerrier's hypothesis that Mallarmé's laryngospasm was the result of a local affection of the larynx, namely an internal laryngocele. Unfortunately, Guerrier's argumentation was based on Mallarmé's vocal medical file and we no longer have the quotation of his communication to the Montpellier Academy of Sciences and Letters in 1988.

Moreover, we do not see very well how Mallarmé's vocal medical file could attest to a specific diagnosis of laryngocele.

This communication attempts to describe the circumstances of the appearance of the laryngeal sphincter during the passage from sea life to terrestrial life.

It also briefly sketches the history of the original description of the laryngocele, describes the personality of the poet and his voice and finally it evokes the state of Parisian laryngology at the end of the 19th century

Nasal hyperreactivity in chronic upper airway inflammation and its impact on disease control and general wellbeing

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Introduction and aim: Nasal hyperreactivity (NHR) is defined as the predisposition of the upper airways to react excessively in response to common environmental stimuli that would produce little or no effect in healthy subjects. It is variably present in different rhinitis phenotypes; however, it has not been studied in rhinosinusitis, nor are there data on its impact on disease control. The aim of our study was to evaluate prevalence of self-reported nasal hyperreactivity and its impact on disease control and general wellbeing.

Material and methods: We performed a single-center, questionnaire-based study in patients with physician-diagnosed chronic upper airway inflammation and healthy controls enquiring the prevalence of self-reported NHR. Symptom severity was assessed using visual analogue scales (VAS). Furthermore, mental wellbeing was studied using validated scales (Patient Health Questionnaire-9, General Anxiety Disorder-7, Perceived Stress Scale, Patient Health Questionnaire-15).

Results: Fifty-two percent of patients (N=386) reported NHR, compared with 16% in the control group (N=101, $p<0.0001$). In the patient population, self-reported NHR had the highest prevalence in patients with allergic and mixed phenotypes (61%, N=73 and 97), followed by non-allergic rhinitis (48%, N=68) and chronic rhinosinusitis without and with nasal polyps (43%, N=76 and 40%, N=67 respectively). Chronic rhinosinusitis patients with concomitant allergy had a significantly higher prevalence of self-reported NHR compared with their non-allergic counterparts (63% and 41%, $p=0.0021$). No difference in VAS-scores could be observed between patients with and without self-reported NHR. For depression, but also for anxiety, stress and somatization, patients scored higher compared with controls, but there was no effect of presence of NHR.

Conclusions: NHR is a prevalent phenomenon in patients with chronic upper airway inflammation and is not restricted to patients with high disease severity or uncontrolled cases. Also, chronic upper airway inflammation has a significant impact on mental wellbeing, regardless of the presence of NHR.

Transcutaneous ultrasound for maxillary disease screening in intensive care unit: a preliminary study

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Introduction and aim: Nosocomial airway infections are common and associated with high morbidity and mortality in Intensive Care Unit. Endotracheal intubation duration is an independent risk factor for maxillary sinusitis, which is a frequent gateway for pneumoniae, meningitis or sepsis. Diagnosis remains challenging, as CT imaging is not easily repeated in the daily assessment of unstable patients. Our aim was to evaluate the efficiency of transcutaneous ultrasound to screen maxillary sinus infection.

Material and methods: Patients presenting to our ENT department with a same-day sinus CT scan were prospectively included in this pilot study. Maxillary transcutaneous ultrasounds were performed by two independent examiners and scored in supine and sitting positions, blindly to the CT imaging, the clinical and endoscopic evaluations. Ability to diagnose sinusitis, repeatability in different positions and inter-examiners comparison were studied. Ultrasound scores were compared to Lund-Mackay-derived CT scores.

Results: 7 patients (5 men and 2 women, median age 60 [56-64]) were enrolled in this experiment. In total, 14 left and right maxillary sinus were studied by same-day sinus CT scan and ultrasound in prone and sitting positions by 2 blind and independent examiners. Ultrasound was able to detect maxillary pathology the majority of the cases, with a sensitivity of 71.4% and a specificity of 87.5% in sitting position. However, sensitivity dropped to 46.8% in prone position, with a preserved specificity of 84.4%. Agreement between examiners was observed in 85.7% cases.

Conclusion: Transcutaneous ultrasound was capable of screening for maxillary sinus disease compared with conventional sinus CT scan. A special attention should be paid to patient position, as sitting position improved the screening accuracy. Agreement between examiners could be improved. Moreover, despite its limitations, it is an attractive method for the screening of maxillary disease, allowing the ability to screen and/or monitor infection in unstable patients.

Management of inverted papilloma: about 58 cases

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Introduction and aim: Inverted papilloma (IP) represent one of the most common benign neoplastic lesions of the sinonasal tract. Their main characteristics are a relative local aggressivity, a possibility of multiple localization, a high recurrence rate and a possible transformation to carcinoma.

Material and methods: We retrospectively analyzed surgical results in patients diagnosed with IP in our hospital between 1998 and 2018 considering the techniques (open vs endos), the rate and time of recurrence. Tumor extension was classified according to Krouse staging system.

Results: A total of 58 surgeries were performed. Mean age at diagnosis was 60.3 years and predominantly male were included. Forty-six patients underwent primary surgery at our institution and 12 patients underwent revision surgery for a recurrence after a first surgery performed elsewhere. In both groups, the most frequent tumor implantation site was maxillary sinus followed by the ethmoid. In the primary surgery cohort, 20% of the patients underwent open and 80% endoscopic surgery. In the revision cohort, all patients had an endoscopic procedure. Six patients relapsed in the primary group and 3 in the revision one. This difference was not statistically significant. Recurrence was twice as frequent after open surgery, but this difference was also not significant. Time to recurrence was very variable with a minimum of 4 months and a maximum of 14 years. Only one case of malignant transformation was recorded. The median follow-up period was 5 years.

Conclusions: We support a purely endoscopic approach as the approach of choice for most IP. Therefore, external approaches are no longer the gold standard. Because of the possibility of late recurrence and late malignant transformation, a prolonged follow-up is encouraged.

Is baseline SNOT-22 able to predict outcome and localize pathology? A prospective multicentre study

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Introduction and aim: SNOT-22 was initially designed for rhinosinusitis, but was recently validated in various nose conditions. We sought to optimize the use of SNOT-22 by predicting the outcome of patients and healthy volunteers solely based on the pattern of the baseline SNOT-22.

Material and methods: Sixty-six healthy volunteers and 383 patients presenting to the rhinology clinic of 3 ENT academic departments participated in this cross-sectional multi-centre study. SNOT-22 from all participants were collected blindly prior to diagnosis. Participants were then categorized in 4 groups according to their outcome: control, medical rhinologic condition, functional nose surgery, sinus surgery. Difference between groups was assessed by a multinomial logistic regression adjusted for age, gender, history of nose surgery and trauma.

Results: The 22 items of SNOT differed significantly among the 4 groups ($p < 0.05$). Control subjects showed the lowest SNOT-22 scores for all items. Patients requiring sinus surgery and those listed for nose surgery exhibited a specific pattern of SNOT-22 score. Nasal and extranasal rhinology symptoms were more specific to the diagnosis than psychological or sleep dysfunction domains.

Conclusion: Distinct SNOT-22 patterns were associated to subjects outcome. SNOT-22 was able to differentiate patients from controls, to score severity, and could further provide an accurate description of pathology. Baseline SNOT-22 could help localize pathology in the sinus or in the nose and predict the need for surgical treatment.

Dutch translation and linguistic validation of the FACE-Q rhinoplasty module

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Introduction and aim: FACE-Q was developed by Klassen et al. in 2010 as a validated psychometric evaluation instrument for patients undergoing aesthetic surgery. The aim of this study was to translate, adapt and linguistically validate the FACE-Q rhinoplasty module into a Dutch version of the FACE-Q questionnaire conceptually equivalent to the original English version.

Materials and methods: “Satisfaction with the nose” and “Satisfaction with nostrils” questionnaires were used and translated from English into Dutch. The translation process and cross-cultural adaptation was conducted with respect to the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) and WHO guidelines. For the validation of the newly created Dutch FACE-Q rhinoplasty module, thirty rhinoplasty patients were included. Cronbach’s alpha was used to determine internal consistency. For test-retest reliability analysis, the Intraclass correlation and Pearson’s correlation coefficient were calculated. The responsiveness of the questionnaires was measured by calculating the effect size, using Cohen’s D. Construct validity was assessed by calculating the Spearman rank correlation coefficient for the FACEQ, the Utrecht questionnaire and the Visual Analogue scale.

Results: Each step in the translation process allowed us to make changes to achieve a conceptual translation equivalent to the original version. Statistical analysis, of the Dutch FACE-Q rhinoplasty module of 30 rhinoplasty patients, ensured adequate internal consistency, reliability, responsiveness and validity.

Conclusions: The use of international translation guidelines, with a strict translation back-translation process, led to a Dutch version conceptually corresponding to the original. The Dutch FACE-Q rhinoplasty module is a valid and reliable tool to the clinician who is evaluating the Dutch-speaking rhinoplasty patient.

Random forest classification to predict response to high-definition transcranial direct current stimulation therapy for tinnitus

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Introduction: Tinnitus, the perception of sound in the absence of an external sound source, has a worldwide prevalence of 10-20%. Noninvasive brain stimulation techniques such as transcranial direct current stimulation (tDCS) are hypothesized to reduce tinnitus severity by modifying cortical hyperactivity in brain regions associated with tinnitus perception, but individual response to tDCS treatment has proven to be extremely variable. We employed random forest (RF) classification, a supervised machine learning approach, to predict treatment response in chronic subjective tinnitus patients.

Methods: Ninety-nine tinnitus patients received six biweekly sessions of high-definition (HD) tDCS of the right dorsolateral prefrontal cortex (rDLPFC). Before treatment and at a three-month follow-up time point, patients filled in in the Tinnitus Functional Index (TFI), a Visual Analogue Scale (VAS) to assess tinnitus loudness, the Hospital Anxiety and Depression Scale (HADS), and the Edinburgh Handedness Inventory (EHI). RF classification with five-fold cross-validation was applied to predict positive response to treatment, defined as a minimum reduction of 10 points on the TFI.

Results: Thirty out of 99 patients responded successfully to HD-tDCS treatment. The RF classifier predicted treatment response with an accuracy of 87.05% and an area under the curve of 0.864, corresponding to a sensitivity of 76.54% and specificity of 92.99%. Feature importance analysis revealed that patients with higher TFI, VAS and HADS depression scores and negative EHI scores, corresponding to left-handedness, were more likely to respond positively to HD-tDCS treatment.

Conclusions: Individual response to HD-tDCS treatment may be accurately predicted using questionnaire data. Patients with higher tinnitus burden, concurrent depressive symptoms and/or a preference of the left hand may respond more positively to HD-tDCS of the rDLPFC. Although larger studies are necessary to validate the proposed classifier, our results might provide the basis for better and more personalized guidance towards the right treatment for chronic tinnitus patients.

Decreased hippocampal neurogenesis in acute-onset otovestibular failure in mice: revealing the underlying pathophysiology of cognitive dysfunction

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Introduction and aim: Hearing loss has been associated with cognitive decline and is considered to be an independent risk factor for dementia. Recently, the impact of bilateral vestibulopathy (BV) on cognition has gained more interest, since it commonly co-occurs with sensorineural hearing loss (SNHL). Brain atrophy has been observed in patients with SNHL in large studies using serial MRI-scanning which may provide an explanation, but little is known on the exact cause of this atrophy. The aim of this study was to investigate the effect of acute-onset and irreversible otovestibular failure on hippocampal neurogenesis in mice.

Methods: Twenty-three 129S mice were divided into two groups, a control group (n=11) and an allylnitril (n=12) group. Oral intake of allylnitril has been established to provide a selective symmetrical otovestibular failure in less than a week. The control group was treated with corn oil. Auditory function was tested by measuring the auditory brainstem response (ABR). Vestibular function was evaluated by testing reflexes and observing spontaneous behaviour, as suggested by Llorens et al. Evaluation of hippocampal neurogenesis was performed 4 weeks after treatment by quantification of neural precursor cells and proliferating cells in the dentate gyrus stained with doublecortin (Dcx) and Ki67, respectively. Before the statistical analysis, the average cell densities of Dcx- and Ki67-positive cells were calculated.

Results: Auditory evaluation using ABR confirmed complete deafness in the 12 mice treated with allylnitril. In the control group, no significant differences were found before and after treatment in mean ABR-thresholds at all frequencies. Mean total vestibular dysfunction rating (VDR) in the control group remained 0 throughout follow-up, which represents normal vestibular function. The allylnitril exposure resulted in mean total vestibular rating scores of 13.5 (SD =1.13) at 4 days after exposure and 12.5 (SD = 1,75) at 55 days after exposure, which represents bilateral vestibular failure. Using immunohistochemistry, neurogenesis in the dentate gyrus was evaluated. In the right hemisphere, no significant difference was observed between the control and the treated group. In the left hemisphere, the difference between mean cell densities of Dcx-positive cells of the control group (M = 0.018998; SD = 0.0057038) and the treated group (M = 0.0128; SD = 0.00535) was statistically significant (t(16) = 2.378; p = 0.030). The difference between mean cell densities of Ki67 positive cells of the control group (M = 0.0091; SD = 0.00428) and the treated group (M = 0.0069; SD = 0.00328) was not significant (t(16) = 1.243; p = 0.232). After individual hemisphere analysis, the independent t-test demonstrated a significant difference in mean cell density per mouse of Dcx-positive cells, but not for the Ki67 positive cells between the two groups.

Conclusion: Decreased hippocampal neurogenesis was observed in left hemisphere already 4 weeks after onset of acute-onset otovestibular failure. Future research is needed to elucidate the isolated effect of SNHL and BV on the hippocampus and to study long-term effects.

Effect of ketamine/xylazine and isoflurane anaesthesia on auditory brainstem responses and distortion product otoacoustic emissions in mice

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Introduction and aim: Hearing function is routinely assessed in mice using auditory brainstem response (ABR) and distortion product otoacoustic emissions (DPOAE). As these techniques require for mice to remain immobilized throughout the measurement, a mixture of ketamine/xylazine or isoflurane is often used for anaesthesia. However, the effect of these anaesthetics on the outcome of hearing function tests in mice has not yet been comparatively investigated. Therefore, in this study our goal is to evaluate the effect of ketamine/xylazine and isoflurane anaesthesia on hearing sensitivity and outer hair cell function in mice.

Materials and methods: Fourteen Coch+/-CBACa.129S1(Cg)-Cochtm1.1Stw/Mmjax mice underwent ABR and DPOAE measurements under both isoflurane and ketamine/xylazine anaesthesia with a one-week interval. Non-parametric statistical analysis was performed to compare the differences in threshold values between hearing measurements under both anaesthesia.

Results: Hearing thresholds obtained under isoflurane anaesthesia were significantly higher among all frequencies tested by ABR, indicating poorer hearing sensitivity under isoflurane anaesthesia as compared to ketamine/xylazine anaesthesia. Significantly elevated DPOAE thresholds were observed under isoflurane anaesthesia in the mid-to-high frequency region of the cochlea, indicating affected outer hair cell function when using isoflurane anaesthesia as compared to ketamine/xylazine anaesthesia.

Conclusion: Our results demonstrate that isoflurane anaesthesia significantly affects assessment of hearing function in mice, as determined by ABR and DPOAE, compared to ketamine/xylazine anaesthesia. Despite the numerous advantages that make isoflurane an attractive option as a general anaesthetic in murine auditory research, caution should be taken due to its confounding effects on the assessment of hearing function.

Does telematic education and therapy guidance enhance care efficiency and effectiveness?

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Introduction and aim: TelePHON.digital is a digital tool comprising 1) databases with educational information, questionnaires and diary strategies, general and specific exercises, audio-visual illustrations, 2) a logbook registering the moment, duration and manner of exercising, 3) an interactive communication channel. The tool wants to augment social and health related wellbeing, particularly of people with communication and/or swallowing disorders (stroke, Parkinson, head and neck,...). It enables a multidisciplinary approach in a patient centered care.

Material and methods: We performed an online survey in 100 caregivers (35 speech therapists from the Netherlands and 65 from Belgium) and questioned 196 randomly chosen individuals (28% male, 72% female, mean age 41y (5-77y)). Co-creation sessions and interviews provided insight in the user-friendliness and applicability in patients with communication and/or swallowing problems.

Results: In general, 80% of the caregivers favored a telematic tool. The most preferred means was pc and tablet (70% and 49% resp) over smartphone (20%). Main advantages such as time and cost efficiency, and therapy compliance, were reported. 73% found that a health care insurance was a prerequisite, 49% would also use the tool without cost reimbursement. Health care providers unanimously stated that that a digital tool is additional to physical contacts. We observed similar advantages and constrictions in the individual end user group. 71% were professionally active of whom 79% rated their job as communicatively demanding. In general, 65% was in favor of a digital tool for communication and/or swallowing problems. The most preferred means was pc (53%), followed by smartphone (49%).

Conclusion: Therapy over the internet, making the simultaneous presence of both patient and therapist less necessary, is an attempt to enhance time and cost efficiency. Surveying caregivers and individuals confirms this. However, the question remains if telematics also enhances therapy effectivity.

Complication of endoscopic ear surgery : a case report

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Introduction: Endoscopic ear surgery is a recent and confirmed approach of middle ear, chosen by many and experienced surgeon throughout the world.

The choice of this approach is based on strict conditions that must be respected and that determine its limits.

Case report: A case of endoscopic approach to attic cholesteatoma is presented. Through a short video, the management of an induced tegmen tympani injury with CSF leak is illustrated.

Results: Indications and contraindications of the different endoscopic approaches will be recalled. Complications and their management will be discussed.

Conclusions: Endoscopic ear surgery is safe provided that the limits are known and that any complications can be dealt with.

The “hype” of hydrops in classifying vestibular disorders: a narrative review

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Introduction and aim: Classifying and diagnosing peripheral vestibular disorders based on their symptoms, is challenging due to possible symptom overlap or atypical clinical presentation. Therefore the aim of the study was to investigate the diagnostic value of clinical and radiological features, including the in vivo visualization of endolymphatic hydrops, for the classification and diagnosis of vestibular disorders.

Material and methods: A literature search was performed in February and March 2019 to estimate the prevalence of various features in healthy subjects and in common vestibular disorders in order to make a graphical comparison between healthy and abnormal.

Results: Of the features studied, hydrops was found to be a highly prevalent feature in Menière’s disease (99.8%). Though, hydrops has also a relatively high prevalence in patients with vestibular schwannoma (48.2%) and even in healthy temporal bones (12.5%) as well. The mean prevalence of radiologically diagnosed hydrops was 82.3% in patients with (definite) Menière’s disease, 31% in healthy subjects, 28.1% in patients with vestibular migraine, and 25.9% in patients with vestibular schwannoma. A difference of 25.2% in hydrops prevalence was found between the two diagnostic techniques (histology and radiology) in patients with Menière’s disease and 29% in patients with vestibular schwannoma.

Conclusions: Although the visualization of hydrops has a high diagnostic value in patients with definite Menière’s disease, it is important to appreciate the relatively high prevalence of hydrops in healthy populations and other vestibular disorders. Endolymphatic hydrops is not a pathognomic phenomenon and detecting hydrops should not directly indicate a diagnosis of Menière’s disease. Both symptom-driven and hydrops-based classification systems have disadvantages. Therefore, it might be worth to explore features “beyond” hydrops. New image analysis techniques, such as Radiomics, might play an essential role in (re)classifying vestibular disorders in the future.

RBS POSTER AWARDS

Hearing loss caused by urate deposit in the middle ear: a case report and literature review

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Introduction and aim: Out of joints gout manifestations are rare. Only few cases of head and neck urate crystals deposits have been described in the literature. Precipitation in the middle ear cause conductive hearing loss with none or few otoscopic anomalies and difficult imaging diagnosis.

Case report: We report a case of a healthy 58 years old men with middle ear urate deposit causing a progressive hearing loss as very first symptom of gout. The nature of the deposit was unsure on computer tomography (CT) due to atypical density. Final diagnosis was revealed after surgical procedure and histologic examination. A review of the literature is also presented. Seven cases of middle ear urate deposit as first symptom of gout were found and compared.

Conclusion: Progressive hearing loss in middle aged patients with atypical density on CT scan must lead to surgical procedure with histologic examination to exclude urate crystals deposits.

First description and intraoperative images of middle ear malformations in a patient with rare KBG syndrome

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Introduction: KBG syndrome is a rare genetic disease. In about a quarter of patients hearing loss is found, most frequently of the conductive type. We present, to the best of our knowledge, the first explorative middle ear surgery in a patient with KBG syndrome which revealed a peculiar middle ear malformation.

Case report: A 36-year-old man with KBG syndrome presented at our department with bilateral conductive hearing loss. Otosopic findings were normal. Explorative surgery revealed a stapes superstructure draped like a spaghetti string over the dehiscent facial nerve. The crura inserted as a thin stripe on a partially fixed footplate, with superiorly a thin and inferiorly a thick and immobile part. A small split was seen between these two parts. A short malleus and processus longus of the incus were found. The incus appeared to be fixed to the lateral bony wall, but the malleus was mobile, pseudarthrosis was suspected. Placement of a middle ear prosthesis was considered but in this particular case, risks outweighed the possible benefits. The patient was fitted with new hearing aids which he was satisfied about.

Conclusion: Patients with KBG syndrome can present with hearing loss and should be referred for examination. Cone beam CT scan of the temporal bones is essential to differentiate with other middle ear pathology. In our case, a middle ear malformation was found intraoperatively and risks outweighed possible benefits of middle ear surgery.

Case report: Petrous apicitis complicated by meningitis with intracranial air, presenting as incomplete Gradenigo's syndrome

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Introduction: Gradenigo's syndrome is a rare complication of otitis media with extension of the inflammation into the petrous apex of the temporal bone, i.e. petrous apicitis. The classical triad of Gradenigo's syndrome includes suppurative otitis media, ipsilateral abducens nerve palsy, and facial pain in the distribution of the trigeminal nerve.

Methods: The authors present a unique case of petrous apicitis complicated by meningitis with intracranial air, presenting as incomplete Gradenigo's syndrome without abducens palsy.

Results/Case Presentation: A 42-year-old female patient presented with left-sided suppurative otitis media with severe ipsilateral otalgia, deep facial pain and generalized headache. CT imaging revealed left otomastoiditis and petrous apicitis, as well as a small amount of free intracranial air in the area of Meckel's cave. Cerebrospinal fluid (CSF) analysis was suggestive for bacterial meningitis; PCR analysis later confirmed pneumococcal meningitis. Early initiation of treatment with high dose intravenous antibiotics resulted in full recovery.

Conclusion: This atypical case of incomplete Gradenigo's syndrome highlights that the presentation of petrous apicitis is variable and that it can be associated with intracranial complications, even in the absence of abducens nerve palsy.

Bilateral petrified auricles in a patient with panhypopituitarism: case report and overview of literature

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Introduction: Petrified ears are characterized by calcifications or ossifications of the cartilaginous parts of the outer ear. The clinical presentation of a petrified auricle has a wide variation. The most common predisposing factor seems to be local trauma, the most frequent systemic disorder associated with calcification of the auricular cartilage is primary adrenal insufficiency.

Case report: A 58 old year male patient with panhypopituitarism presented at our ENT department with the complaint of bilateral narrowing of the introitus of meatus acusticus externus. Clinical examination showed bilateral rigid concha that were immobile and fixated. Bony occlusion of the introitus of meatus acusticus was seen bilateral. Because of the increasing occlusion, a c-shaped plasty of the meatus acusticus externus was performed.

Conclusion: Petrified ears are an entity characterized by calcifications or ossifications of the cartilaginous parts of the outer ear. Most patients are asymptomatic, some may have discomfort during the application of pressure. Physical examination typically reveals a rigid auricle and spared lobule, without any visible cutaneous abnormality. The most common predisposing factor seems to be local trauma and severe hypothermia. Primary adrenal insufficiency is the most frequent systemic disorder associated with calcification of auricular cartilage. Unless there is discomfort due to local pressure effects, particularly related to sleep, treatment is not necessary.

Otalgia and hearing loss as first presenting symptoms of Wegener's granulomatosis: 2 cases

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Introduction: Wegener's granulomatosis, also known as granulomatosis in association with polyangiitis (GPA), is a systemic vasculitis involving the upper and lower respiratory tract, as well as the kidneys. The prevalence of otologic symptoms of Wegener's granulomatosis as primary manifestation is unknown and the description of these in literature are limited to case-reports

Case report: A 44-year old woman was seen at the ENT department because of acute severe bilateral otalgia and hearing loss. Clinically bilateral acute otitis media was noticed, with massive inflammatory middle ear mucosa after paracentesis. Transtympanic tubes were placed. Tonal liminal audiometry (TLA) showed severe sensorineural hearing loss bilaterally (FI 82dB HL and 63dB HL). Local and systemic treatment (peroral high dose steroids, antibiotics, ear drops) could only bring temporarily relief of the otalgia, however hearing loss remained. Over the weeks, she developed coughing and hemoptysis.

The second patient was a 69-year old man, hospitalised due to bilateral pneumonia with coughing and hemoptysis, who was examined at our department because of bilateral otalgia and hearing loss. Micro-otoscopy showed a double perforation of the right eardrum and inflammatory left eardrum. TLA revealed severe right-sided sensorineural hearing loss with a conductive component (FI 73dB HL) and moderate sensorineural left-sided hearing loss (FI 23 dB HL).

Medical history was unremarkable for both patients. Rhinologic and laryngeal examination showed no further upper airway abnormalities. MR Imaging showed chronic middle ear infection and opacification of the mastoid cells bilateral. Auto-immune serology revealed elevated c-ANCA PR3-titre. Thoracic radiography showed bilateral lung infiltrates, after which bronchoalveolar lavage and biopsies were performed in both patients. Wegener's granulomatosis was confirmed for both patients. Both were treated with high doses of corticosteroids and immunosuppressiva (Rituximab), resulting in partial recovery of the hearing thresholds.

Conclusions: Bilateral middle ear inflammation and sensorineural or mixed hearing loss, can present as primary manifestations of Wegener's granulomatosis. In literature, otologic involvement occurs in 20 to 40% of the patients during the course of this disease. Whenever patients have persisting otologic pathology compared with (bilateral) hearing loss, Wegener's granulomatosis should be included in your differential diagnosis.

Case report: Mumps hearing loss and vestibular symptoms

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Background: Mumps hearing loss is rare in countries with good vaccination rates and is often unilateral, profound and with rapid onset. A full recovery of the hearing is rare.

Case report: We describe a 22-year old male patient with swollen submandibular glands, a profound hearing loss on the left side and dizziness with a nystagmus to the right side. Caloric testing showed a hypofunction of 100% on the left side. Lab results were positive for mumps (IgM, IgG in serum and RNA in saliva) although the patient was vaccinated. His hearing did not recover during the short follow-up of 2 months.

Conclusion: By reporting severe complications such as the present one, the need for eventual adjustments to the existing vaccination strategy may become obvious. In 2011-2013 there was a mumps-epidemic in Belgium. In 2018, the incidence was again higher than the year before. Mumps complications might be less historic than previously thought.

Otological disease in Turner syndrome

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Introduction and aim: Turner women are known to present multiple ear and hearing problems, ranging from external morphologic abnormalities to sensorineural or conductive hearing loss. The exact pathophysiology behind these otological diseases is not yet completely understood. The aim of this study is to provide an overview of the current literature on the prevalence and pathophysiology of otological disease in Turner patients.

Materials and methods: A PubMed database (Medline) search was performed. For the evaluation of the prevalence of otological disease in Turner syndrome (TS) the following selection criteria were applied: original publication between 1998-2018, ≥ 50 participants and presence of a clear methodological section.

Results: The prevalence of otological disease as external ear deformities (23-53%), recurrent otitis media (20-76%) and hearing loss (36-83%) is high in TS. The auditory phenotype is complex and dynamic with conductive hearing loss due to middle ear disease at young age and sensorineural hearing loss later in life. The mid-frequency dip and a 45,X or 46,XiXq karyotype are prognostic factors for a more rapid deterioration of hearing function. There is low level evidence that the middle ear disease in Turner patients is more recurrent and refractory than in normal population. Adequate early treatment may prevent further deterioration with the need for more extensive surgical interventions. Growth disturbances due to chromosomal imbalance and haploinsufficiency of the SHOX gene seem to be contributing factors in the development of the otological disease in TS. Hormonal treatment with estrogens or growth hormone has no effect on hearing function.

Conclusions: Otological disease affects a high proportion of Turner patients and is characterized by complexity and progression. All Turner patients deserve early, easily accessible and continued screening and follow up in specialized ENT clinics regardless of prognostic factors. Growing insights in its pathophysiology will help the understanding and management of otological disease in Turner syndrome across lifespan.

An uncommon case of unilateral progressive sensorineural hearing loss with subsequent recuperation

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Introduction and aim: Auto-immune inner ear disease (AIED) is the cause of sensorineural hearing loss in less than 1 percent. AIED is characterized by a progressive fluctuating asymmetric sensorineural hearing loss that develops over several weeks to months. Our aim is to raise clinical awareness of this uncommon, but treatable disease.

Case report: A 41-year-old male patient presented with a sudden right-sided sensorineural hearing loss. The sensorineural hearing loss was progressive despite maximal standard treatment for sudden sensorineural hearing loss. A rheumatological and pneumological work-up confirmed the diagnosis of sarcoidosis. The hearing loss recuperated after initiation of treatment with lederthrexate and azathioprine.

Conclusions: There are no specific diagnostic clinical tests for auto-immune inner ear disease. Therefore, knowledge of this condition and a high degree of suspicion on the clinicians side are mandatory. The course of the hearing loss with its relentless progressive nature may guide the clinician. It has been stated that a clinical answer to steroid administration could be considered as a diagnostical criterion for AIED; however, only a small percentage of patients (14%) does respond to steroids. AIED is one of the few forms of sensorineural hearing loss that may be reversible. If the patient does not respond to initial steroid administration or relapses during steroid administration, corticoid sparing agents should be considered.

First case of ethmoidal metastasis from an HPV- induced oropharyngeal squamous cell carcinoma

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Introduction and aim: We report the first described case of ethmoidal metastasis from an oropharyngeal HPV-induced squamous cell carcinoma (OSCC-HPV+). We will also discuss the value of p16 immunostaining in the development and support of this extension.

Case report: 2 years ago, a 67-year-old woman has been followed in our otolaryngology department for dysphagia and oropharyngeal pain. An OSCC-HPV+, classified cT4bN2cM0, was diagnosed and managed by concomitant radio-chemotherapy by our oncology department. The extension assessment including a PET-CT did not show sinus filling. Two years later, the patient showed up with recurrent left sinusitis in the form of nasal obstruction, purulent rhinorrhea and a sensation of posterior throwing. After medical treatment with antibiotic therapy had failed, a left middle meatotomy and a left ethmoidectomy were scheduled. During the surgery, a left ethmoidal mass was quickly identified and biopsied. Histological analysis demonstrated the presence of a squamous cell carcinoma positive for anti-p16 (100% marking) immunohistochemical labeling. Differential diagnoses such as an inverted papilloma were mentioned however given the absence of mass during the first imaging assessment and the full marking for P16 of the tumoral cells, the diagnosis of metastasis was retained. After discussion at a multidisciplinary oncological meeting, the diagnosis of metachronous metastasis of OSCC-HPV+ was made and a complete endoscopic resection associated with adjuvant treatment by radiotherapy were carried out.

Conclusion: We have described the first case of ethmoidal metastasis from an induced oropharyngeal squamous cell carcinoma HPV. HPV-induced oropharyngeal carcinomas are characterized by atypical metastatic locations. Anti-p16 immunohistochemistry is a key element in identifying the oropharyngeal origin of a metastatic lesion.

Adenoid cystic carcinoma of the parotid: an uncommon mode of presentation

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Introduction and aim: Adenoid cystic carcinoma (ACC) is a slowly growing, but aggressive salivary malignant tumor. Its clinical presentation includes facial pain and paralysis. This type of tumor frequently has a perineural and perivascular extension and distant metastasis occurs most frequently in the lung. The aim of this case is to show how an uncommon presentation of facial paralysis can be the sign of a malignant pathology that comes from the peripheral system.

Case Report: We present a case of a 76-year-old woman who came for an ENT consultation following right facial nerve paralysis, which appeared to be at first a central pathology. The basic ENT physical examination was normal, and the paralysis was grade IV (at the beginning) to VI (at the end), according to the classification of House Backman. Many complementary examinations were carried out in order to exclude inflammatory, central and tumoral conditions. Ultimately, an adenoid cystic carcinoma of the right parotid with a skip lesion in the right internal auditory canal was found. Treatment consists of right parotidectomy with neck gland dissection, facial reconstruction and post-operative radiotherapy. The peculiarity of this case is that the symptoms initially suggested a central facial paralysis. The presence of a skip lesion in the IAC without any major perturbation in hearing or balance was also atypical. Usually, in this type of tumor, distant metastasis/skip lesion is not observed during initial diagnosis but rather during recurrences.

Conclusion: This case shows that a facial paralysis that clinically seems central can also be the symptom of a peripheral pathology. A good differential diagnosis needs to be provided in order to exclude inflammatory or tumoral sickness. In this situation, the primary lesion was not palpable. In such cases, good collaboration between the clinician and the radiologist is essential.

A rare case of primary mucosal melanoma involving the oropharynx

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Introduction and aim: Melanomas are malignant tumours arising from melanocytes, the pigment-producing cells of our body that protect us against the harmful effects of the sun. The vast majority of melanomas occur on cutaneous surfaces. Rarely, melanomas can also be found in various non-sun-exposed, extracutaneous sites, where melanocytes are scarcely present. We report a rare case of a primary mucosal melanoma (MM) of the oropharynx.

Case report: A 58-year old man of Romanian origin was referred to the ENT department of the Antwerp University Hospital, due to a mass in his left oropharynx. The patient complained of a sore throat, dysphagia, left-sided ear pain and bloody, purulent oral discharge. Despite he overcame his alcohol addiction 20 years ago, he never quit smoking. Fiberoptic endoscopy showed a black mass arising from the left pharyngeal wall at the superior border of the oropharynx with a projection into the nasopharynx, partly visible during mouth examination. Furthermore, a firm cervical lymph node was palpable on the left side in area II. A Positron Emission Tomography and Computer Tomography scan was performed and confirmed an oropharyngeal mass measuring 31 x 18 x 27 mm in size with a cranial projection. Moreover, the scan revealed increased metabolic activity of both the palpable cervical lymph node left and the liver, requiring further examinations. Magnetic Resonance Investigation of the liver confirmed diffuse metastases and an ultrasound of the neck was suggestive for a malignant necrotic lymph node, although the fine needle aspiration cytology was inconclusive. A transoral biopsy was taken under general anaesthesia and the anatomopathological examination showed a nodular MM, which was staged as pT4aN2M1. Full body inspection by the dermatology department did not reveal any suspected skin lesions. Immunotherapy, consisting of nivolumab and ipilimumab, was started.

Discussion: Primary MM represents 1-2% of all melanomas. The most common extracutaneous sites involve the eye, anorectum, sinonasal and oral cavity. Only about ten cases of oropharyngeal MM have been described in the literature. In contrast to cutaneous melanomas, the aetiology and pathogenesis remain unclear. Furthermore, MM are genetically distinct from their cutaneous counterpart, tend to develop later in life, are more often diagnosed at an advanced stage and have a higher recurrence rate. Therefore, MM have a poor prognosis with a 5-year overall survival rate (OSR) of 25%, while cutaneous melanomas have a 5-year OSR of 80%.

Conclusion: MM are rare, yet very aggressive and have a dismal prognosis. Due to the low incidence, metastases from a primary cutaneous melanoma should always be excluded. The epidemiologic, genetic and biologic differences between mucosal and cutaneous melanomas have adverse implications for both treatment and prognosis of MM.

Cervical osteophytes causing dysphagia and unilateral vocal cord paralysis: case report and literature review

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Introduction and aim: Anterior cervical osteophytes can result in oesophageal impingement and distortion, recurrent laryngeal nerve palsy, leading to dysphagia and hoarseness. Diffuse idiopathic skeletal hyperostosis (DISH), also known as Forestier's disease, may be recognised as underlying condition and is considered an underdiagnosed and mostly asymptomatic nonprimary osteoarthritis. The exact etiology of DISH remains unknown and validated diagnostic criteria are absent. The condition is recognized radiologically (Zhang, 2014). A literature review identified a limited number of published cases of dysphagia and/or vocal fold paralysis due to osteophytes secondary to osteoarthritis. The objective of this case report is to increase awareness of this rare cause of dysphagia and recurrent laryngeal nerve palsy and give an update on the approach and treatment of this condition (Virk, 2012).

Case report: We report a case of a 75-year-old patient presenting with dysphagia and an unilateral vocal cord paralysis. By diagnosis of exclusion, cervical osteophytes at the level of the sixth and seventh cervical vertebrae were withheld as diagnosis. The patient responded to speech and swallowing therapy and no further intervention was required.

Conclusions: The etiology of dysphagia and unilateral (or bilateral) paralysis of the recurrent laryngeal nerve must be fully investigated and, although rare, degenerative cervical spine disease should be considered as part of the differential diagnosis (Virk, 2012). Management of this condition is typically multidisciplinary, including medical therapy, speech and swallowing therapy (Sebaaly, 2018). Surgical decompression through osteophyctomy is effective for patients who fail conservative treatment.

Case report: pharyngeal recess cyst causing temporal abscess

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Introduction: Mucous retention cysts (MRC) and nasopharyngeal branchial cleft cysts (NBC) are two types of benign cysts of the pharyngeal recess (BCPR). By impeding middle ear ventilation, they can lead to otologic complications.

Case Report: A 63-year-old man with no past ENT history, presented with left otalgia in a context of fever, vertigo and vomiting. He appeared confused and agitated, displaying Wernicke's aphasia. Brain imaging showed left temporal lobe abscess with hydroaeric level. Left middle ear and mastoid cavity were filled with inflammatory fluid. Neurosurgeons realized biopsy of abscess while middle ear was drained by the otologist. During work-up, benign cyst of pharyngeal recess was found on MRI and identified as primary cause. After prolonged intravenous antibiotic therapy and marsupialization of cyst, patient retrieved normal neurological status.

Discussion: Many MRC of pharyngeal recess are misdiagnosed as NBC. ENT literature is increasingly reporting NBC's. Radiologists, on the other hand, published high prevalence of incidental findings of MRC in pharyngeal recess. According to them, NBC's are extremely rare and present similar radiological features. Moreover, both present same histopathology. No BPCR causing temporal abscess has been described to date.

Conclusion: Anatomical relationship and age at time of diagnosis are the only characteristics which can distinguish pharyngeal recess' MRC from NBC. Benign cyst of pharyngeal recess is a correct term which encompasses both. It can lead to severe otologic complications if left untreated. This report reminds us the importance of fiberoptic nasopharyngeal endoscopy when confronted with unilateral otologic symptoms in an adult with no past otologic history.

Validation of Choline PET-CT for pre-operative localization of parathyroid adenomas: a single centre retrospective study

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Introduction/aim: Pre-operative localization of parathyroid adenomas is important for both quality and duration of surgical parathyroidectomy and for ‘cure’ of the hyperparathyroidism afterwards. Parathyroid adenomas have been discovered by coincidence on Choline PET-CT, carried out in the work-up of other diseases. Recent studies show high sensitivity and specificity of Choline PET-CT, compared with echography, ^{99m}Tc-MIBI scintigraphy, MRI and 4D CT. We reviewed success rates of Choline PET-CT for localizing parathyroid adenomas.

Materials and methods: The records of 157 patients who underwent parathyroidectomy were reviewed retrospectively. Besides descriptive statistics and overall cure rates, success rates of localizing parathyroid adenomas by Choline PET-CT were evaluated, as well comparison with other imaging techniques like echography and ^{99m}Tc-MIBI scintigraphy .

Results: Of 157 patients, 110 (70,06%) underwent parathyroidectomy for primary hyperthyroidism. Of the 110 patients who underwent parathyroidectomy for primary hyperparathyroidism, 26 (23,64%) underwent Choline PET-CT in their pre-operative work-up. Of these 26, 15 had a correct exact per-operative localization of the parathyroid adenoma, and 7 identified the correct side (left or right). 2 were wrongly localized and 2 were unclear on Choline PET-CT. This is only a small group of patients, but we can calculate a sensitivity of 65.22%, or even 91.67% when only looking for side of the parathyroid adenoma, whereas echography has a sensitivity of 57.29% for exact localization and 87.25% for lateralization, and ^{99m}Tc-MIBI has a sensitivity of 43.33% for exact localization and 58.89% for lateralization in our series. MRI was performed in 22 patients, with sensitivity of 61.11% for indication of side. 4D CT was rarely performed in our patient group.

Conclusion: This retrospective study seems to support the hypothesis of Choline PET-CT being a superior method for localization of parathyroid adenomas. Larger studies are needed for confirmation. Ultrasound continues to be the first line examination since it has an acceptable accuracy for localization of parathyroid adenomas, has almost no side effects and is much cheaper.

A rare case of sternoclavicular septic arthritis associated to a pharyngo-cutaneous fistula after total laryngectomy

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Introduction and aim: pharyngocutaneous fistulae are amongst the most frequent complications encountered following oncologic and functional total laryngectomy procedures. We will review the epidemiologies, risk factors, possible complications and recent treatment recommendations. We also would like to share a rare complication of sternoclavicular septic arthritis.

Case report: A 70 years old undernourished female patient with a history of right partial laryngectomy and adjuvant chemoradiotherapy for a right piriform sinus squamous cell carcinoma was hospitalized for a laryngeal chondronecrosis. We had no other solution than performing a functional total laryngectomy. Unfortunately, a large pharyngo-tracheal fistula developed as an early postoperative complication. Two weeks later, the patient developed a shoulder pain with an erythema of the left peri-tracheostomal skin. A local infection occurred with a significant dehiscence of the cervical suture and a pre-manubrial subcutaneous collection. The soft tissue infiltration reached the sternoclavicular joint. Bone biopsy demonstrated anaerobic bacteria osteo-arthritis and CT-scan showed the proximity of the collection from great mediastinal vessels. After multidisciplinary discussion, we performed a left sterno-claviculectomy, a surgical drainage and a closure with a Latissimus Dorsi pediculate musculocutaneous flap. The patient recovered well and received a complimentary 6-weeks intravenous antibiotics with ceftriaxone and trimethoprim/sulfamethoxazole. The fistula resolved later after adequate nutrition, local care and the use of a salivary bypass tube.

Conclusions: Sternoclavicular septic arthritis is a rare complication associated to pharyngocutaneous fistula. The recovery was complete after 6 weeks of antibiotics, resection of the infected bone and flap reconstruction. This case highlights the importance of nutritional status and previous radio/chemotherapy as major risk factors of fistula and local complications in total laryngectomy.

Sinonasal hemangiopericytoma: 2 case-reports

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Introduction and aim: Sinonasal hemangiopericytomas are a rare cause of recurrent epistaxis. These tumors of perivascular origin account for approximately 2,5% of all vascular sinonasal tumors. Only about 200 cases are described in literature. Here, we describe their clinical and histopathological characteristics by presenting 2 patients with a different presentation and severity.

Case report: Two male patients in their 7th decade presented with recurrent epistaxis. One had no other symptoms, whilst the other also had a blocked nose, frontal headache and epiphora.

Nasal endoscopy showed a space-occupying polypoid lesion in the left cavum nasi in both patients as the source of bleeding. This mass was confirmed on imaging (CT and/or MRI), located in ethmoid and sphenoid in both men, however different in size (37 x 34 x 20 mm vs. 47.7 x 46 x 28.5 mm) and destruction, and with extension to lamina cribrosa, orbital floor, nasal septum and maxillary sinus wall in the second patient. The lesions were endoscopically removed and anatomopathological analysis confirmed the presence of a sinonasal hemangiopericytoma in both patients. Careful histologic examination showed a low proliferation index and the lesions were differentiated from other tumors like a solitary fibrous tumor using immunohistochemistry. The patient with the larger tumor had a recurrence of this lesion within one year, which was again removed endoscopically. Close clinical follow-up is mandatory as these tumors have an unpredictable course.

Conclusion: Sinonasal hemangiopericytomas are a rare cause of epistaxis. Clinically, they have to be differentiated from nasal polyps to which they may resemble. Their extent needs to be assessed with imaging, and careful anatomopathological examination is necessary. The treatment of choice is complete endoscopic resection. These tumors have a good prognosis when removed completely. However, lifelong clinical follow-up is necessary, as 18% of these tumors reoccur and malignant transformation is possible.

Uvulopalatopharyngoplasty for breathing difficulties 21 years after total rhinectomy: a case report

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Introduction and aim: Total rhinectomy is an uncommon procedure that is exclusively reserved for locally advanced, aggressive or recurrent malignancies of the nasal framework. The removal of the vast majority of the nasal framework and related soft tissues not only has disfiguring consequences but also interferes with normal nasal function. Only few articles have been published about the specific functional sequelae of total rhinectomy. This case report presents an unknown, functional side effect, apparent 21 years after total rhinectomy, and its treatment by uvulopalatopharyngoplasty (UPPP).

Case report: In April 1997, a 62-year-old male was diagnosed with a nasal schwannoma at the level of the nasal septum and right nostril. Treatment consisted of total rhinectomy with partial resection of the septum and bone-anchored prosthetic rehabilitation. In October 2018, the patient presented with complaints of nasal blockage and breathing difficulties, leading to dyspnoea during both day- and nighttime. Topical treatment with nasal irrigation and ointments turned out to be not effective. Fibreoptic laryngoscopy revealed adhesion of the soft palate to the pharyngeal wall causing significant narrowing at this level. Accordingly, the patient underwent traditional UPPP with tonsillectomy in July 2019. At present, 5 months after surgery, the breathing difficulties, in particular during daytime, have disappeared, resulting in an improved quality of life.

Conclusion: Total rhinectomy is an invasive procedure that impairs the intranasal humidification and heating of inspired air. This may cause mucosal dryness, adhesions between pharyngeal structures, and ultimately upper airway narrowing or obstruction. The use of UPPP for obstructive sleep apnoea has diminished over the past years due to the emergence of less invasive procedures. According to this case report, however, UPPP can be a viable treatment for daytime breathing difficulties in selected patients, for example after total rhinectomy, with distinct upper airway narrowing at the level of the velopharynx.

Recurrent acute rhinosinusitis caused by a rare immunological deficiency: about a case of Good syndrome

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Introduction and aim: Good Syndrome (GS) is a rare association of thymoma and immunodeficiency. GS was described about 50 years ago, but its pathogeny remains unclear. Patients with GS are often between 40 and 70 years old at diagnosis and develop thymoma, recurrent rhinosinusitis and pulmonary infections, hematological alterations, and sometimes autoimmune manifestations.

Case report: We present the case of a 60-year-old man whose medical history was free of significant disease up until the year before. Recently however, he had suffered from two pneumonias, had undergone the surgical resection of a thymoma, and an endoscopic surgery for chronic rhinosinusitis. Endoscopic examination had shown good postoperative mucosal healing.

Two months later, he started presenting recurrent episodes of acute rhinosinusitis (*Haemophilus Influenzae*). Each time, the symptoms responded fully to antibiotic therapy. After the fifth episode, an immunological assessment was ordered and the blood test highlighted hypogammaglobulinemia. The complementary hematological assessment confirmed this and immunophenotyping showed the absence of B-cells from peripheral blood. Other hypogammaglobulinemia etiologies were excluded. Because of the association of a thymoma and hypogammaglobulinemia, the diagnosis of GS was evoked. Treatment with subcutaneous immunoglobulin once a week was started and well tolerated by the patient. One year later, he had only needed antibiotics twice, for acute prostatitis and rhinosinusitis. Up to now, he has not developed any autoimmune manifestation.

Conclusions: GS is a rare acquired immunodeficiency characterized by the association of thymoma and hypogammaglobulinemia. Prognosis is determined by the severity of the infections and autoimmune diseases. ENT clinicians should be aware of the need for immunological assessment in patients presenting with recurrent rhinosinusitis, in order to permit early diagnosis and treatment of GS as well as other – more frequent – immunological deficiencies.

SMARCB1-Deficient sinonasal carcinoma presenting as unexplained deformation of the nostril

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Introduction and aim: SMARCB1-deficient carcinoma is a recently described variant of poorly differentiated sinonasal carcinomas, currently still classified under undifferentiated sinonasal carcinomas in the WHO classification. It is characterized by complete loss of nuclear SMARCB1, a tumor-suppressor gene located on chromosome 22q11.2. The number of clinical cases described is limited (< 100). It is usually an aggressive tumor located in the sinuses. We describe a case report of a SMARCB1-deficient carcinoma in a young patient located in the nostril and paranasal soft tissue with difficult diagnosis.

Case report: A 27-year old man presented with an increasing deformity of the left nostril. Patient noticed the first changes at the age of 18. He consulted different specialists, but no formal diagnosis was made. At our department MRI showed a small contour thickening of the left nostril with associated underlying soft tissue contrast enhancement (1,2 x 1,5 cm), CT-scan only showed some chronic sinusitis. Biopsy showed no abnormalities. In the absence of a clear diagnosis the patient was followed every six months, but after 1,5 years the complaints worsened and the lesion had increased on CT and MRI. Explorative surgery was now decided and showed invasion in the maxilla as well as expansion in the nasal cavity. Multiple biopsies were taken and the diagnosis of an SMARCB1-deficient sinonasal carcinoma was made. The tumor was staged as T4aN0M0. The patient underwent total excision of the tumor, including resection of soft tissue at the left hemi nose and anterior maxillary wall in combination with a neck dissection and ALT flap reconstruction, followed by adjuvant chemoradiation with weekly cis-platinum. Patient is currently still receiving chemoradiation (2 months after diagnosis).

Conclusion: SMARCB1-deficient sinonasal tract carcinomas are a recently described clinical entity. Although rare, awareness of their existence is important to start adequate therapy for this aggressive tumor type.

Cavernous sinus thrombosis of nasal origin: A seven-year-old immune competent girl suffering from cavernous sinus thrombosis (CST) due to nasal furunculosis

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Introduction and aim: Cavernous sinus thrombosis of nasal origin is a rare and serious complication of infections in the nasal area. Early diagnosis is critical as aggressive treatment is mandatory to ensure a good outcome. Local skin infection in children can be a common pathology, but in this case of nasal furunculosis a septic cavernous sinus thrombosis occurred. The purpose of this article is to report and take into account this rare and dangerous complication.

Case report: A seven-year-old girl was hospitalised with high fever and furunculosis of the nasal dorsum and tip. On admission she had a temperature of 40.6°C, tachypnoea and an increasing swelling of both eyes with normal ocular movement. She was not complaining of headache and was not presenting any other neurological symptoms. A CT-scan showed a periorbital cellulitis on the right site. An additional MRI-scan demonstrated a cavernous sinus thrombosis and confirmed a periorbital cellulitis with limited post-septal expansion. The patient was transferred to the intensive care unit where intravenous antibiotic and anticoagulation therapy was started. Flucloxacillin and cefotaxime (later switched to clindamycin) associated with heparin therapy (later switched to tinzaparine) was the main treatment, complemented with local skin care with Iso-betadine gel and a single drainage of the most voluminous pus collection of the nasal dorsum. Both the swap of the furunculosis and the blood culture showed *Staphylococcus aureus*. With aggressive treatment and close observation, the patient could be discharged from the intensive care unit and after 3 weeks she could leave the hospital in general good health. The tinzaparine therapy will at least be continued for 3 months.

Conclusions: This case emphasizes the importance of early recognition of cavernous sinus thrombosis of nasal origin in children as aggressive treatment is critical to prevent morbidity and mortality in this young population.

Rhinolithiasis: a rare clinical entity

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Introduction and aim: Rhinolithiasis is a rare clinical entity. A rhinolith is defined as a hard nasal mass that results from a chronic inflammatory response to an endogenous or exogenous intranasal foreign body. Rhinoliths grow in time and may cause different clinical symptoms, depending on the size and localisation. Often they present as an incidental finding. Both nasal endoscopy and CT imaging are important in the diagnostic work-up and may highlight associated pathologies or anatomic anomalies. In this poster we present the clinical, radiological and histological features of 5 rhinolith cases.

Materials and methods: A retrospective chart review was conducted of 5 patients with rhinolithiasis, diagnosed between 2009 and 2019. Clinical, radiological and anatomopathological characteristics were assessed and compared with the literature.

Results: There was a female preponderance, constituting 80% of the patient population. The mean age was 59 years (range 26-80 years). Purulent rhinorrhea (60%) was the main clinical symptom, followed by nasal obstruction (20%) and epistaxis (20%). One case was an incidental finding during nasal endoscopy. CT imaging showed a calcified mass, mostly located in the inferior meatus (80%). The most common concomitant pathology was nasal septum deviation (60%), followed by rhinosinusitis (40%) and mucosal thickening of the maxillary sinus (20%). Removal of the rhinolith was performed in 4 cases. Histopathology showed an exogenous particle with deposition of calcium salts in 1 case.

Conclusions: Cases of rhinolithiasis are rare and the exact etiology remains unclear. It should be considered in patients complaining of unilateral, foul-smelling rhinorrhea and nasal obstruction. Diagnosis depends on nasal endoscopy, which shows a grayish concretion mainly below the inferior turbinate, and CT imaging, which shows a calcified intranasal mass with a radiolucent or hypodense centre. Treatment consists of endonasal removal.

Nasolabial cysts: case series: multicentric study

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Introduction. Nasolabial cyst also called nasoalveolar cyst is a benign, non-odontogenic, soft tissue cyst, located in the nasolabial fold. It is submucosal and remains extraosseous. It expands into and in front of the pyriform aperture, downward into the gingivolabial sulcus, and laterally into the soft tissue of the face. It affects middle-aged women with coloured skin. When symptomatic, surgery is the treatment of choice.

Aim of the presentation: To report a series of 24 patients presenting a nasolabial cyst diagnosed and treated in 3 different ENT departments in 3 different countries: Belgium, Tunisia and Morocco between April 2010 and September 2019. Patients and method: There were 17 women. The mean age was 56 years old. Ranges are 20-76. There was 7 men: The mean age was 46 years old; Ranges : 36-61. The lesions were unilateral in 23 patients (17 left sided; 6 right sided). Tobacco and bad oral status play a role as a favorizing factor. The diagnosis was made by the clinical examination and imaging (TDM in 24 patients and MRI in 2 patients)

Results: In 2 cases the cyst was asymptomatic after administration of systemic oral broad spectrum antibiotic. These patients are followed in the consultation. Alar deformity was noticed in 24 patients, nasal obstruction in 8 and recurrent infections in 10. Surgery was performed via a limited sublabial approach in 19 patients. Endoscopic endonasal marsupialization was performed in 3 patients in Belgium. All the patients are asymptomatic with a minimum followup of 1 year.

Conclusion: Nasolabial cysts are particularly rare in native Belgian population but much more common in Tunisia and Morocco. Alar deformity is the most common symptom. Surgery is commonly performed via a limited transoral sublabial approach but endoscopic endonasal marsupialization is a valid alternative.

Transcutaneous acoustic implants and magnetic resonance imaging

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Introduction and aim: To awaken awareness of potential problems and risks when implanting a patient with a transcutaneous magnetic acoustic implants in the light of future need of an MRI.

Materials and methods: An overview of the current available transcutaneous magnetic acoustic implants systems in light of MRI safety issues is given. The rate of MRI's performed worldwide is continuously increasing with currently more than one MRI per second. When counseling a patient or parent before implantation of a transcutaneous acoustic implant MRI and his difficulties must be mentioned.

Results: Careful thought is warranted when implanting a child or adult with a transcutaneous magnetic acoustic implant. Chances are nearly 100% of needing an MRI in lifetime, leading to problems of torque, force and demagnetisation... These problems occur most commonly when an MRI of the foot or knee is needed, and less with MRI's of the head. An additional problem present when an MRI of the head and neck is taken, is metal artifacts. Metal artifact reduction sequences, such as the SEMAC-VAT WARP sequence significantly improve the diagnostic usefulness of post implantation MRIs of the head and neck area.

Conclusions: Careful thought is warranted when implanting a child or adult with a transcutaneous acoustic implant, as chances are nearly 100% of needing an MRI in the future.

Hamartomas of the sinonasal tract and nasopharynx presenting as a solitary lesion: rare, underdiagnosed and various histological lesions

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Introduction: Hamartoma of the sinonasal tract and nasopharynx is a relatively new diagnosis, only added to the World Health Organization classification of tumors in 2005. The most common type is the REAH reported for the first time by Wenig and Heffner in 1995. Since their description some other histological types have been described in the literature.

Aim of the presentation: To report a series of 8 patients presenting a hamartoma of the sinonasal tract as a solitary lesion diagnosed and treated successfully between January 2008 and January 2020.

Patients and method: There were seven women. The mean age was 65 years old. Ranges are 27 and 81. There was one man: age 53 years old. The lesions were unilateral in six patients (3 left sided; 3 right sided) and 2 were bilateral. The lesions were located in the olfactory cleft in 6 cases and were attached to the anterior wall of the sphenoid sinus in 2 cases. Two patients were asymptomatic. The other patients complained with nasal obstruction and rhinorrhea.

The diagnosis was made in all the cases by the histologist. In 6 cases we performed a limited but complete endonasal endoscopic resection without ethmoidectomy.

Results: All the patients are asymptomatic with a minimum follow up of 6 months.

The histology confirms the diagnosis of REAH in 6 cases. 1 patient has a COREAH; another one has a Seromucinous Hamartoma.

Conclusion: Hamartomas of the sinonasal tract and nasopharynx presenting as a solitary lesion are rare and often misdiagnosed. Examination of the olfactory cleft and posterior portion of the nasal cavity is mandatory to visualize the lesion. Histology is mandatory to confirm the diagnosis and rule out other lesions classified as Low-Grade Epithelial Proliferations of the Sinonasal Tract. Limited but complete surgical extirpation is the treatment of choice.

Acute stridor in a patient with rheumatoid arthritis

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Introduction: Rheumatoid arthritis is an autoimmune systemic disease with a great variety of clinical presentation. In literature, the prevalence of laryngeal manifestation ranges from 30% to 75%. Laryngeal manifestations include fixation of the cricoarytenoid joint, recurrence neuropathy, myositis and laryngeal nodules. This causes symptoms such as globus pharyngis, hoarseness, voice weakness, swallowing problems and dyspnoea.

Case report: A 69-year old woman, known with rheumatoid arthritis, asthma and obstructive sleep apnoea, presented at the emergency room because of increasing complaints of dyspnoea and dysphonia for 4 days, with stridor and intercostal retractions in upright position. Oxygen saturation was 90%. Flexible laryngoscopy revealed both vocal cords in paramedian position with limited abduction capacity. The acute stridor was caused by superficial rapid hyperventilatory breathing due to pneumonia, which necessitated hospitalisation. She was treated with intravenous antibiotics, low dose corticosteroids and inhalation sprays. Several daily short-lasting dyspnoea episodes with mild and temporary decreases in saturation were observed. At day 3, she developed acute non-resolving dyspnoea, with desaturation at 85%. Real-time laryngoscopy showed bilateral fixed median vocal cords. Urgent tracheotomy was performed and high doses of corticosteroids were administered. After two weeks, the patient was discharged with trachea cannula. Further clinical follow-up showed gradual remobilisation of the vocals after a few weeks. Furthermore, webbing of the anterior commissure was removed by laser. Tracheotomy cannula could be removed after 14 months.

Conclusion: This case illustrates that cricoarytenoid joint arthritis may lead to acute complete fixation of the cricoarytenoid joints, causing potential life-threatening situations. The authors also stress the importance of administrating high doses of corticosteroids in the treatment/prevention of this complication, even in case of major infectious disease such as pneumonia. This should be discussed in a multidisciplinary fashion.