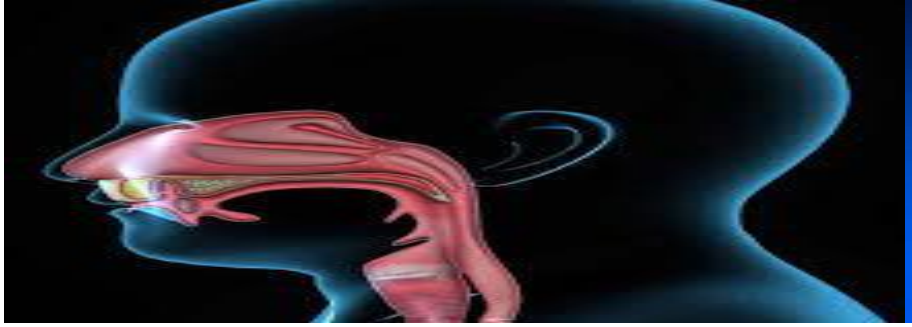
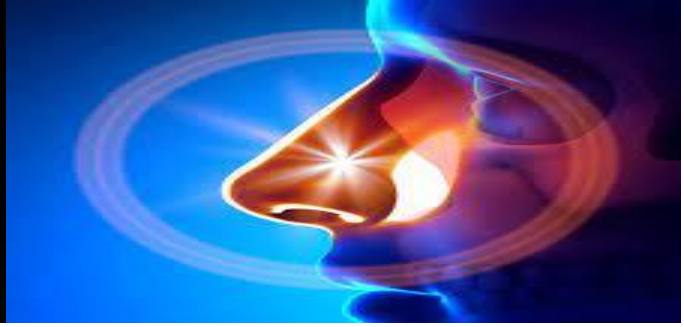



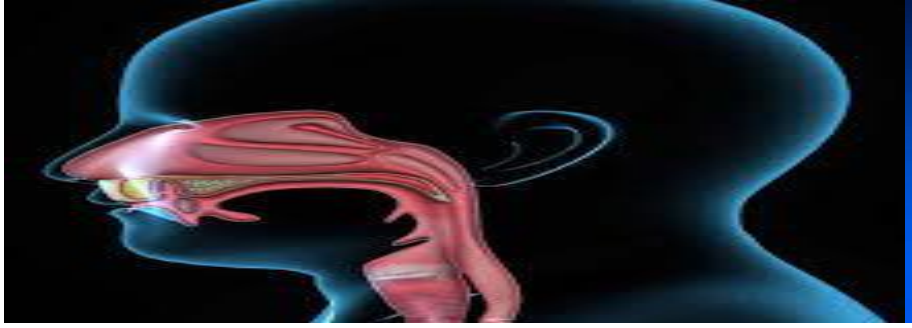
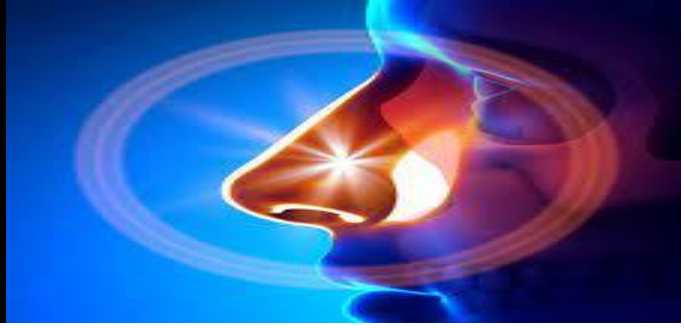
ENT NEWSBUZZ

Vol 3 | Issue 15 |2024

Dear Doctor,

Greetings from Micro Labs limited. We are happy to bring you "ENT NEWSBUZZ" which contains latest and interesting news.
Inside This Issue:

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in
Looking forward to your valuable feedback
Best Regards,
Medical Team, Micro Labs Ltd

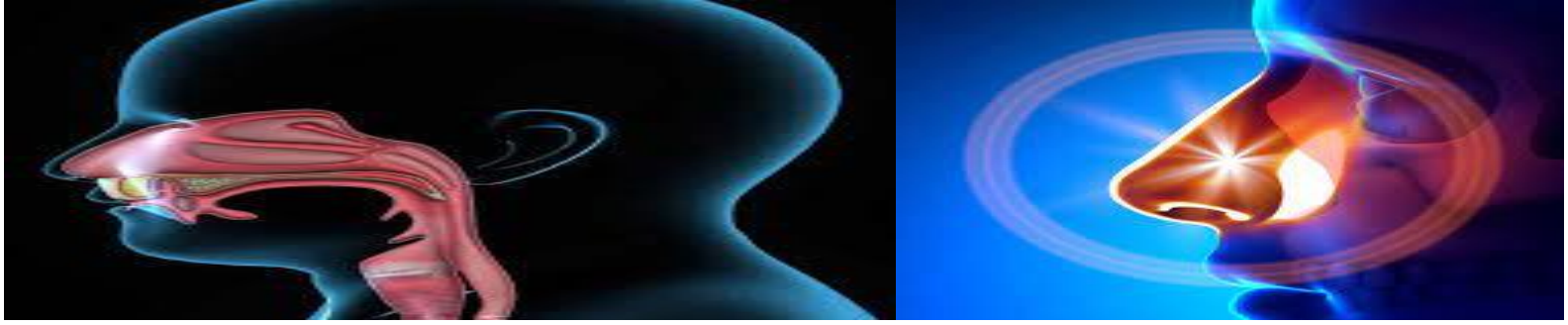
ENT NEWSBUZZ Vol 3 | Issue 15 |2024

Evaluation the efficacy of various hyperbaric oxygen therapy approaches in patients suffering from sudden sensorineural hearing loss

Introduction: Sudden Sensorineural Hearing Loss (SSNHL) refers to the abrupt onset (less than 3 days) of perceptive hearing loss with a deficit exceeding 30 dB in three contiguous frequencies. The prevalence of SSNHL was higher in the 43–53 age group (77 per 100,000) than in the <18 age group (11 per 100,000). Although a complex origin has been proposed, the pathogenesis of SSNHL remains unclear. Several diseases, including autoimmune inner ear diseases, vascular problems, acoustic tumors, viral infections, medication toxicity, and psychological disorders, can cause SSNHL.[1] Hyperbaric oxygen therapy (HBO) was used as an essential or salvage therapeutic option in addition to systemic or intratympanic steroid therapy. Studies have shown that the perilymphatic fluid's oxygen tension increases dramatically in hyperbaric settings. HBO therapy may lessen damage to the cochlea, which was vulnerable to ischemia, by assisting in the delivery of oxygen into the inner ear tissues.[2] As per the latest scientific data, HBOT ought to be initiated no later than two weeks following the onset of symptoms. However, there were no clear recommendations for HBOT.[3]

Hyperbaric oxygen therapy for sudden sensorineural hearing loss

Thus, the purpose of this study was to assess how various HBOT profiles affected the improvement of hearing in SSNHL patients.



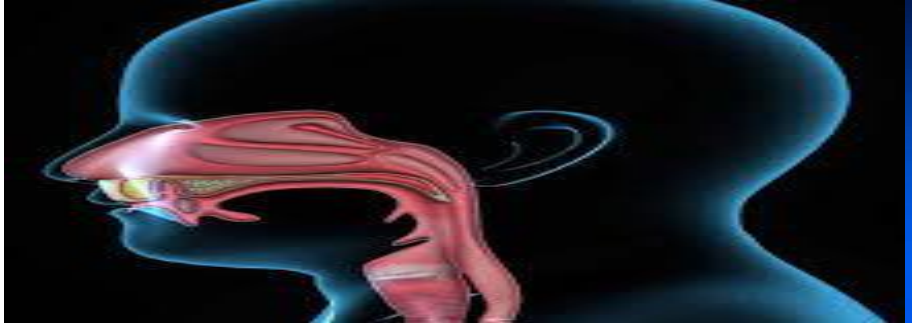
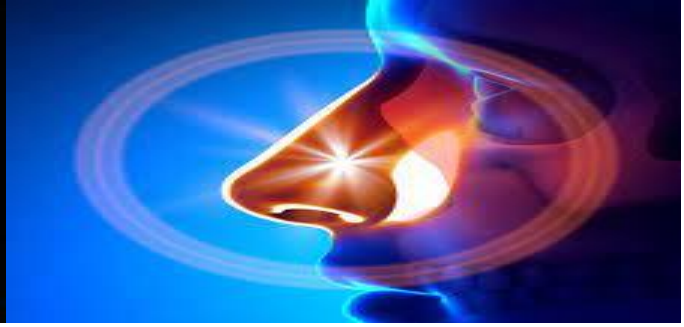
Methods: This retrospective analysis comprised 218 individuals who were receiving HBOT for SSNHL. The completeness of medical records, including information on whether the patient had pure-tone audiometry (PTA) prior to and during HBOT, and a diagnosis of SSNHL were the research's eligibility requirements. As per the AAO-HNS recommendations, a rise in the hearing threshold stimulus to >30 dB HL over three audiometric frequencies, evolving over a maximum of 72 hours, was one of the diagnostic criteria for SSNHL. The primary factors taken into account for the SSNHL diagnosis were the PTA results. An Interacoustics AC40 audiometer was used to measure the air conduction (AC) and bone conduction (BC) frequencies in the tests. An analysis was done on the connection between the length of treatment and the postponement of hyperbaric therapy. Examining the importance of variations in PTA's mean hearing threshold between the pre- and post-treatment periods for each subgroup was the initial step. The final step in the statistical analysis was to evaluate the statistical significance of hearing improvement with the number of hyperbaric chamber cycles.

Results: The study group had an average hearing threshold stimulus of 54.6 (±31.3) dB HL before therapy, which decreased to 39.6 (±32.2) dB HL after treatment. In BC, there was a noticeable reduction in hearing threshold, which was clear evidence that SSNHL has improved (Table 1). For individuals treated with 15 cycles or fewer, a statistically significant improvement in hearing was shown across all frequencies examined. With the exception of 1500 Hz, every frequency showed statistically significant improvement in hearing in patients receiving more than 15 cycles of treatment. The improvement in hearing at frequencies of 1500, 3000, and 4000 Hz was statistically not significant in the group receiving treatment after a delay of more than 10 days.

Frequency [Hz]	Before [dB]	After [dB]	Difference	*p*
250	41.22	26.03	15.19	<0.001
500	48.05	28.68	19.37	<0.001
1000	49.05	30.52	18.52	<0.001
1500	69.40	32.72	36.68	<0.001
2000	52.49	34.86	17.63	<0.001
3000	56.76	38.11	18.65	<0.001
4000	54.03	38.67	15.35	<0.001

Table 1. BC before and after receiving combined ST and HBOT treatment

Discussion: For both early and late therapy of SSNHL, the combination of HBOT with oral steroids (OS) was a beneficial option. When starting treatment more than 14 days after the onset of symptoms, the combination of HBOT and OS proved to be the most effective option.[1] A safe and well-tolerated treatment option for individuals suffering from idiopathic sudden sensorineural hearing loss (ISSNHL) was HBO therapy. This method has been shown to significantly enhance audiologic function in people with profound hearing loss, and as such, it was a promising therapeutic alternative for this patient population.[2]

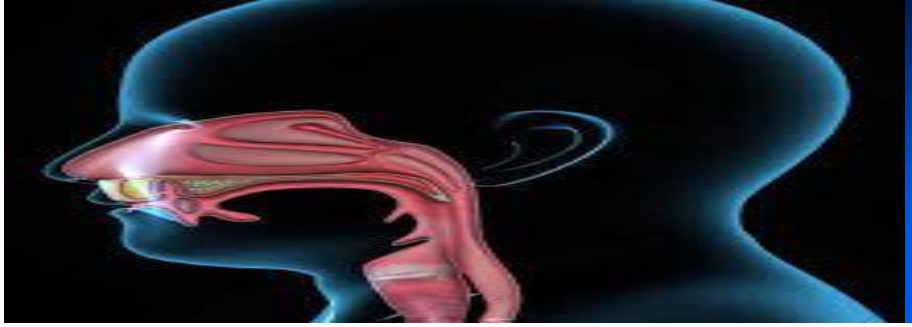



Conclusion: The current study concluded that individuals who got HBOT after 10 days showed no significant improvement in their high-frequency PTA hearing threshold. Therefore, it appeared advantageous to begin HBOT for SSNHL within the first ten days of the condition. The patients who received more than 15 cycles of HBOT saw a decrease in the statistical significance of hearing improvements.

The rapid initiation of hyperbaric oxygen therapy (HBOT) may be a key component in the treatment of sudden sensorineural hearing loss (SSNHL).

References:

1. Cavaliere M et al. Combination of Hyperbaric Oxygen Therapy and Oral Steroids for the Treatment of Sudden Sensorineural Hearing Loss: Early or Late? Medicina (Kaunas). 2022 Oct 10;58(10):1421.
2. Choi Y et al. Hyperbaric oxygen (HBO) therapy as an effective approach to the treatment of patients with severe idiopathic sudden sensorineural hearing loss. Acta Oto-Laryngologica. 2020 May 3;140(5):383-6.
3. Rozbicki P et al. Assessing the Effectiveness of Different Hyperbaric Oxygen Treatment Methods in Patients with Sudden Sensorineural Hearing Loss. Audiol Res. 2024 Mar 29;14(2):333-341.



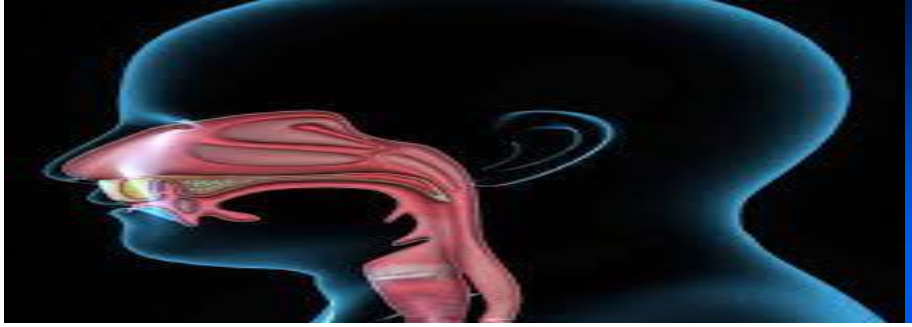

ENT NEWSBUZZ Vol 3 | Issue 15 |2024

Investigation of the lung function in Chronic Rhinosinusitis (CRS) patients with Chronic Cough (CC)

Introduction: Chronic cough (CC) is a frequent disease; it affects roughly 10–20% of the general population and significantly lowers quality of life. A chronic cough (CC) is characterized by a cough that lasts longer than eight weeks. This condition can be caused by a variety of factors, such as asthma, COPD, gastric reflux disease, tobacco smoking, occupational irritants, and air pollution. Chronic rhinosinusitis (CRS) is a diverse and complex disease that affects the nose and paranasal sinuses in 1–5% of the population.[1] It has been demonstrated that the onset of chronic cough was independently associated with chronic rhinitis or rhinosinusitis. However, the exact processes of chronic cough in rhinosinusitis patients were not fully understood.[2] Although a clear mechanism has not been identified, CRS may potentially play a role in the pathophysiology of pulmonary illnesses associated with CC. No prior research has examined pulmonary function in individuals with CRS who have been diagnosed with CC using the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) criteria.[1] This study aimed to identify the lung status of CRS patients with CC who do not exhibit any abnormal results from a radiological chest examination.

Methods: In this study, a total of 109 CRS patients with CC were included after 1413 CC patients were retrospectively screened. The Sino-Nasal Outcome Test, peripheral blood eosinophil count, immunoglobulin E concentration in serum samples, Lund-Mackay Computable Tomography (CT) score, lung function, and smoking status were all evaluated. Normal controls are also recruited. The Lund-Mackay CT staging system was utilized to determine the radiographic severity of CRS, and each participant underwent a paranasal sinus CT scan. The Sino-Nasal Outcome Test (SNOT-20) questionnaire was used to assess subjective symptoms.

Results: The patients' forced expiratory volume in 1 second (FEV1.0), FEV1.0/forced vital capacity (FVC) ratio, and percent predicted FEV1.0 were all considerably lower than those of the control group. The FEV1.0/FVC ratio was widely considered the most reliable indicator of obstructive lung function alterations in the pulmonary function test. Furthermore, FEV1.0 and %FEV1.0, two additional metrics that similarly showed alterations in obstructive lung function in the CRS patients with CC, were substantially lower in the CRS patients with CC than in the




normal control group (Table 1). The Lund-Mackay CT scores of the patients with high CT scores showed a negative correlation with the FEV1.0/FVC ratio. The patients with a high CT score (≥12) had substantially higher scores for postnasal discharge and thick nasal discharge than the patients with a low score ($p < 0.05$). Patients with a high CT score had considerably higher ratings in the rhinologic domain of the SNOT-20 (desire to blow the nose, sneezing, runny nose, postnasal discharge, and thick nasal discharge) than did patients with a low CT score.

	Patients	Controls	p
%VC (%)	95.0±11.9	94.4±10.0	0.898
FVC (L)	3.35±0.89	3.45±0.86	0.397
$FEV_{1.0}$ / FVC ratio (%)	77.9±7.9	82.5±11.7	<0.001
$\%FEV_{1.0}$ (%)	87.7±13.0	96.9±10.6	<0.001
$FEV_{1.0}$ (L/s)	2.61±0.74	2.89±0.69	0.024

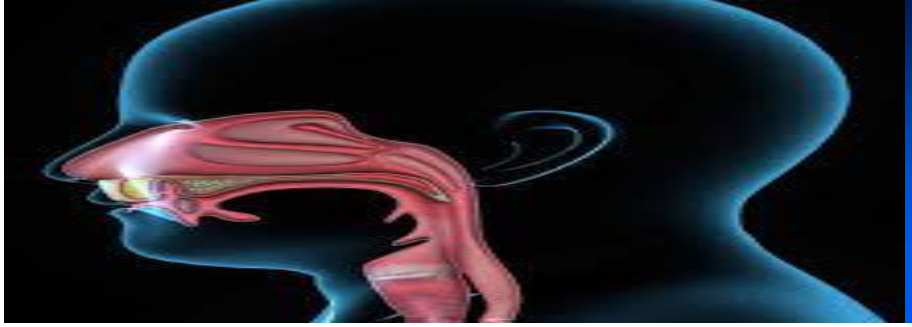
Data represent mean ± standard deviation.
%VC, Percent Predicted Vital Capacity; FVC, Forced Vital Capacity; $FEV_{1.0}$, Forced Expiratory Volume in 1 second; $\%FEV_{1.0}$, Percent Predicted $FEV_{1.0}$.

Table 1. Pulmonary function of both the normal control individuals and the patients prior to bronchodilator inhalation.

Discussion: In this study, the Lund-Mackay CT scores of the patients with high CT scores were inversely connected with the FEV1.0/FVC ratio.[1] According to the Kariya S et al., there was a negative correlation between the Lund-Mackay CT scores before and after bronchodilator inhalation, the percent predicted forced expiratory volume in 1 second (FEV1.0), and the FEV1.0/forced vital capacity ratio. For individuals with chronic coughs, the Lund-Mackay CT score may be helpful in evaluating the state of the lower airway. An important component of treating a persistent cough should be upper airway examinations.[3]

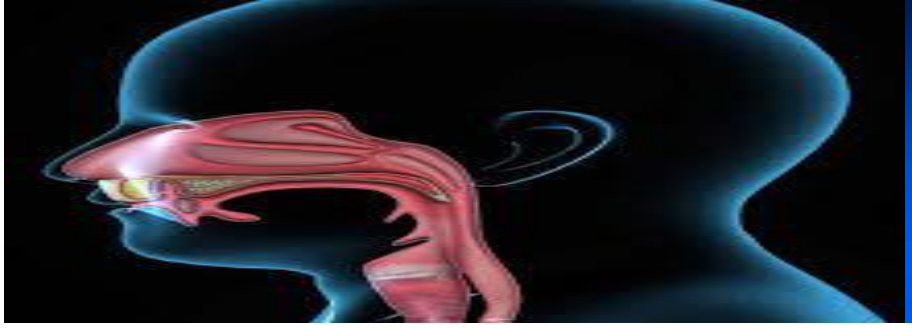
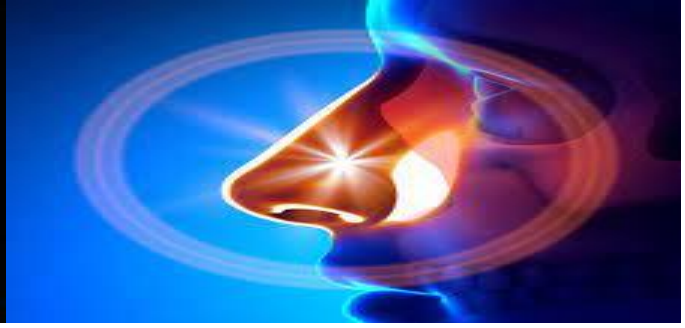
Conclusions: The current study concluded that obstructive lung function abnormalities were seen in CRS patients with CC who did not exhibit clinically evident lung disease. Patients with severe CRS showed a decrease in the FEV1.0/FVC ratio. Nasal discharge and postnasal drip may be partially responsible for the decreased lung function in CRS patients with CC.

Lung function should be examined in chronic rhinosinusitis (CRS) patients with chronic cough (CC). A pulmonologist must be included in the multidisciplinary evaluation in order to manage CRS patients with CC.




References:

1. Zhao P et al. Chronic rhinosinusitis possibly associated with decreased lung function in chronic cough patients. Brazilian Journal of Otorhinolaryngology. 2024 Jul 1;90(4):101424.
2. Dąbrowska M et al. Chronic cough related to the upper airway cough syndrome: one entity but not always the same. European Archives of Oto-Rhino-Laryngology. 2020 Oct;277:2753-9.
3. Kariya S et al. Lund–Mackay Computed Tomography Score Is Associated With Obstructive Pulmonary Function Changes in Chronic Cough Patients. American Journal of Rhinology & Allergy. 2019 May;33(3):294-301.

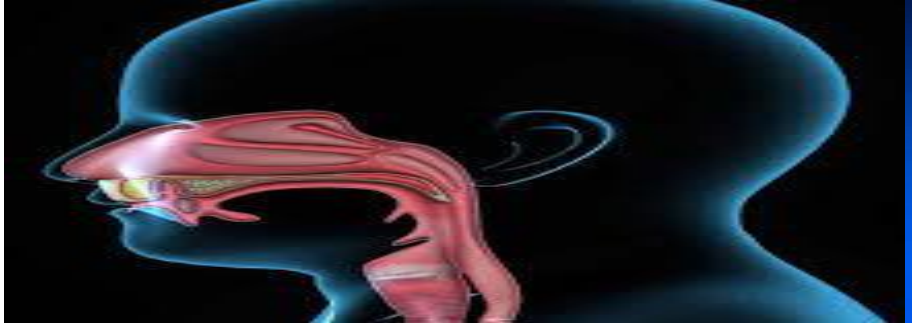



ENT NEWSBUZZ Vol 3 | Issue 15 |2024

Assessment of the validity of High-Frequency Audiometry Tool Using Bayesian active (BA) learning algorithm

Introduction: Audiometry is the first test used to examine a patient for hearing loss or abnormalities. Standard audiometry (SA) is typically performed in the range of 125 to 8000 Hz in 1 or 0.5 octave steps. But the range of frequencies that humans can hear was between 20 and 20,000 Hz.[1] However, traditional audiometry has been reported to be unreliable in diagnosing auditory impairment due to the inability to identify responses at extended high frequencies (EHF) above 8 kHz. Monitoring EHF responses, on the other hand, may be very valuable in the early detection of hearing loss in some groups. Because changes in EHF hearing occurred before changes in conventional tests at frequencies below 8 kHz, research has shown that evaluating the hearing sensitivity at EHF could be useful for monitoring the auditory function of patients using ototoxic drugs.[2] In addition, high-frequency audiometry (HFA) can be helpful in conjunction with sound acoustics (SA) in detecting severe acoustic injuries and, consequently, early detection of noise-induced hearing loss. Moreover, a link was discovered indicating a causal relationship between the phenomena of the strength and laterality of tinnitus and high-frequency hearing loss. The test was not currently performed in clinics, despite the stated advantages that the HFA-added information would provide. The reason could be a time factor, which relates to the increased cost of spending more time on a single patient. Audiologists or clinicians actually conduct the audiometry test; they present the sound through the audiometer and wait for the patient's response, telling them to press a button only if they hear the sound. However, there were increasing evidence that determining sensitivity at high frequencies may serve as an alternative for identifying covert hearing loss and, possibly more precisely, inner ear synaptic damage.[1] So, this study aimed to evaluate the validity of a high-frequency audiometry instrument that uses Bayesian learning to provide a fast, automatic, repeatable, and predictable assessment.

Methods: Three tests were used in the study to determine the high-frequency thresholds in 85 participants (138 ears): conventional audiometry (SA), an algorithm based on alternative forced choice (AFC), and an algorithm based on Bayesian active learning (BA). In order to evaluate the test-retest reliability, each test was conducted twice. Participants were selected from a pre-existing database as well as from new sources. To reduce the possibility of higher thresholds




above 8 kHz, the only recruitment requirement for participants already in the database was a maximum threshold of 60 dB hearing level (dBHL) at 8 kHz. Prior to the testing, otoscopy was used to inspect the participants' ears, and a series of generic questions regarding tinnitus, hyperacusis, and hearing in noisy environments were utilized to determine whether the participants subjectively perceived their own hearing.

Results: Comparing the BA with the other two tests revealed median differences within ±5 dB up to 10 kHz and median differences within ±10 dB at higher frequencies. Variability increases from lower to higher frequencies. A boxplot showing the difference between the thresholds determined by frequency by the BA and SA was presented in Figure 1. The BA had lower thresholds than the SA at the majority of frequencies. Age, hearing impairment, and tinnitus test findings were all similar among the groups. High test-retest reliability (>90%) was observed in the BA data. Compared to the AFC, the BA required less time (4 min vs. 13 min).

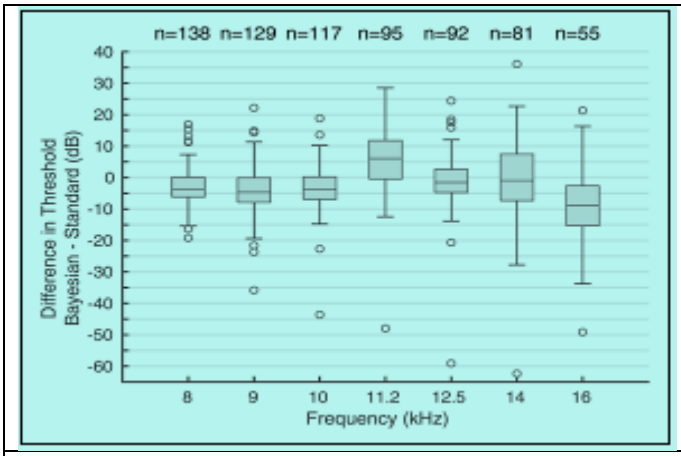
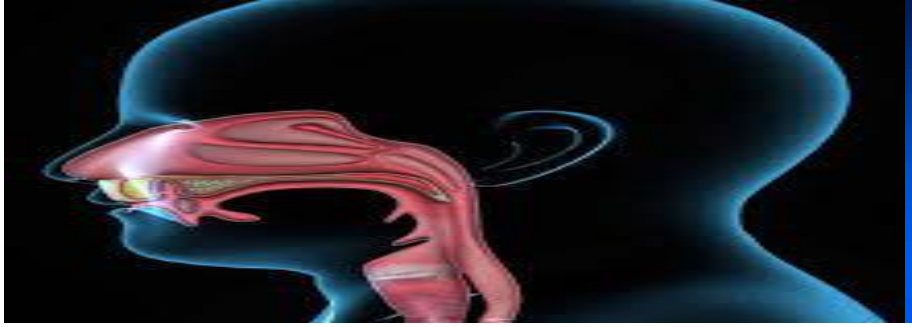


Figure 1: Boxplot showing the frequency-based difference between the thresholds determined by the BA and SA.

Discussion: Wang M et al. found that there was a definite age dependence in the hearing thresholds at EHF from 9 to 20 kHz for the prediction of hearing loss compared to frequencies below 8 kHz.[2] Schlittenlacher et al. employed pulsed tones in their investigation because they were easier to notice than pure tones for tinnitus listeners. One may anticipate comparable outcomes for pure tones or warble tones if the same was true for the broader frequency range taken into consideration in the current investigation. Additionally, they compared a manually operated audiometer using continuous tones with their Bayesian method using pulsed tones.[3]

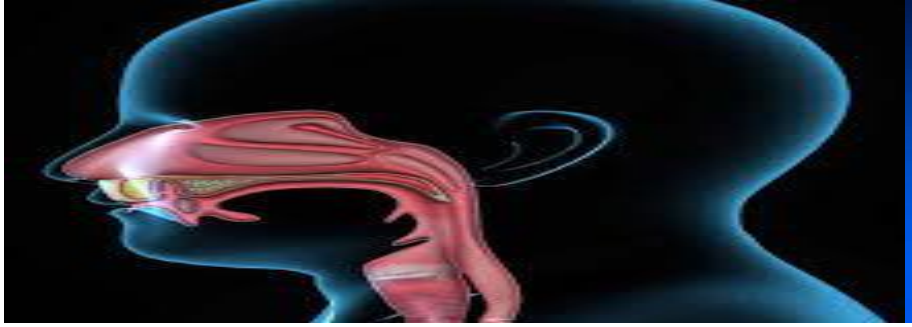
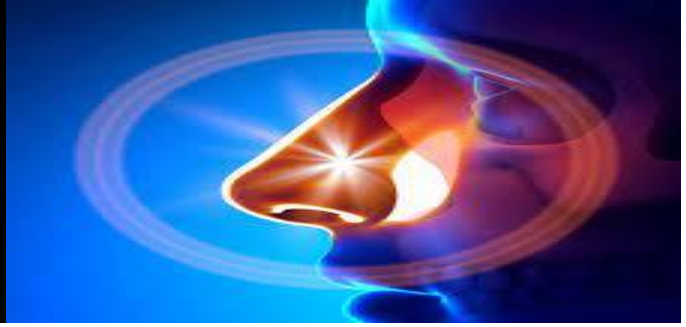
Conclusion: The current study concluded that the Bayesian learning-based audiometry test demonstrated satisfactory tool performance at high frequencies. Test-retest reliability was consistently excellent, and the variation from the standard procedure matched the HFA error range. Given the test's short execution time—on average, around 4 minutes—it could be an effective way to include the HFA in clinical screening processes.

The Bayesian learning test for high-frequency audiometry may be a suitable option for clinical screening. It would provide reliable and significant information without taking up too much time during the visit.




References:

1. Casolani C et al. Evaluation of a fast method to measure high-frequency audiometry based on bayesian learning. Trends in Hearing. 2024 Jan; 28:23312165231225545.
2. Wang M et al. Extended high-frequency audiometry in healthy adults with different age groups. Journal of Otolaryngology-Head & Neck Surgery. 2021 Jan;50(1):52.
3. Schlittenlacher J et al. Audiogram estimation using Bayesian active learning. The Journal of the Acoustical Society of America. 2018 Jul 1;144(1):421-30

ENT NEWSBUZZ Vol 3 | Issue 15 |2024

Case report on nontuberculous mycobacterial mastoiditis

Introduction: Nontuberculous mycobacteria (NTM) refers to all acid-fast microorganisms other than Mycobacterium tuberculosis. NTM are common organisms that can be found in food, water, and soil.[1] In children, these opportunistic microorganisms frequently result in cervicofacial lymphadenitis and lung infections. Despite an increase in prevalence over the past few decades, they are the rare cause of mastoiditis. The most frequent cause of NTM mastoiditis is a variant of NTM called Mycobacterium abscessus. Because it grows quickly and shows signs of resistance to multiple drugs, it is especially difficult to treat. Although many antibiotics are recommended, there are currently no particular guidelines for effective therapy.[2] This case presented NTM mastoiditis in an immunocompetent child.

Case presentation:

A 3-year-old immunocompetent girl child came to the pediatric otolaryngology clinic with a history of 2.5 years of recurrent acute otitis media treated with bilateral myringotomy and tympanostomy tube insertion, as well as left mucoid otorrhea that had not responded to two months of ciprofloxacin/dexamethasone drops. Mycobacterium abscessus was discovered during culture. A temporal bone computed tomography (CT) scan revealed erosive alterations to the incus and mastoid air cells' bones, along with nearly total opacification of the middle ear cavity, external auditory canal, and mastoid air cells (Figure 1). After a left tympanostomy tube replacement and removal, the patient had a left cortical mastoidectomy. Significant mucosal illness and osteitis without bone mastoid damage were identified as intraoperative findings. A peripherally implanted central catheter was used to administer imipenem-cilastatin, amikacin, and linezolid. The mastoid and middle ear remained the exclusive sites of infection. A follow-up CT scan 2.5 months following surgery revealed no problems and better middle ear aeration (Figure 2).

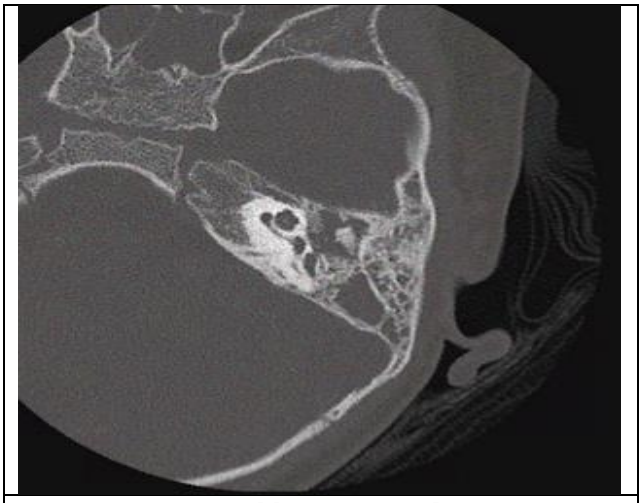
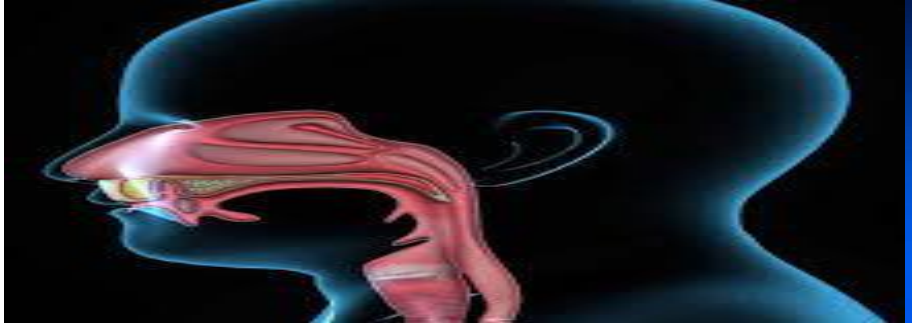
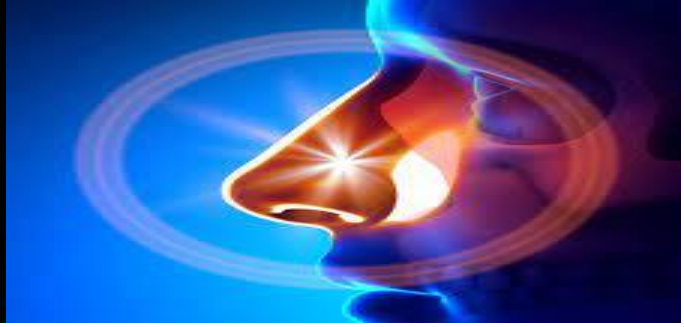


Figure 1. Temporal bone CT at diagnosis

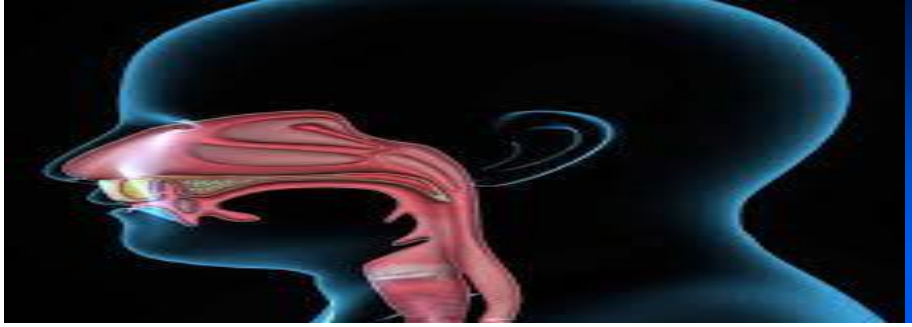
After nine weeks of surgery, a slight left sensorineural hearing loss (HL) was found on an audiogram. Since unmasked bone conduction was normal and bilateral ototoxic effects were expected, mycobacterial infection was thought to be the more likely cause rather than amikacin ototoxicity. No modifications were made to the treatment plan. About 2.5 months following surgery, a repeat audiogram revealed left mixed mild sensorineural and conductive hearing loss. After the mycobacterial infection has been completely eradicated, amplification will be taken into consideration. HL has stayed stable.

Figure 2. Temporal bone CT 2.5 months following the left mastoidectomy

Discussion: Early detection and treatment of otitis media are crucial because prolonged cases have an adverse effect on hearing outcomes. Even without granulation tissues, patients who do not improve with standard care should be evaluated to rule out the possibility of acid-fast bacterial infections. Working together with the microbiology team was crucial when an acid-fast bacterial illness was suspected since it allows for an early evaluation.[1] A diagnostic workup with an acid-fast bacillus culture and smear ought to be carried out in instances where otorrhea was resistant. The ability to detect cerebral extension may be enhanced by magnetic resonance imaging. Successful treatment regimens have included at least three systemic antibiotics for an average of six months, primarily macrolides, aminoglycosides, and linezolid, with or without cefoxitin or cefotaxime.[3]

Conclusion: Patients with fluoroquinolone-resistant and chronic otorrhea should have a strong clinical suspicion of NTM mastoiditis. For such patients, early bacterial culture with staining for acid-fast bacilli should be taken into consideration. Surgical debridement and multidrug systemic therapy are the strategies of treatment.

Early bacterial culture with acid-fast bacilli staining should be considered in patients with nontuberculous mycobacterial mastoiditis.




References:

1. Kajiwara R et al. Bilateral Nontuberculous Mycobacterial Otitis Media: A Case Report. J Int Adv Otol. 2024 Jan;20(1):81-84.
2. Tu LJ et al. Nontuberculous mycobacterial mastoiditis: A case report and literature review. Otolaryngology Case Reports. 2024 Mar 1; 30:100569.
3. Manders J et al. Clinical characteristics and an evaluation of predictors for a favourable outcome of Mycobacterium abscessus otomastoiditis: a systematic review and meta-analysis of individual participant data. International Journal of Infectious Diseases. 2022 Mar 1;116:397-402.