Dear Doctor,

Greetings from Micro Labs limited. We are happy to bring you "ENT BB Connection" which contains latest and interesting news.

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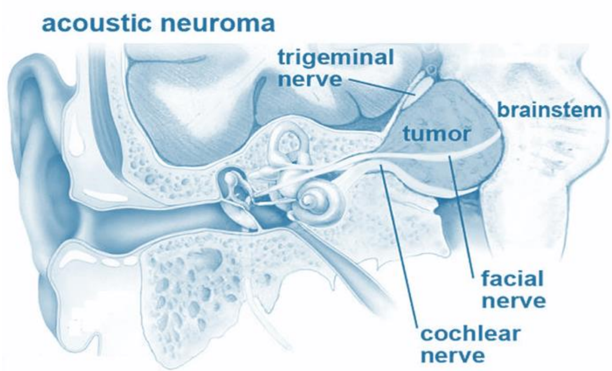
Best Regards,

Medical Team, Micro Labs Ltd

A study on the evaluation of a deep learning predictive model combining clinical and radiomic features for short-term postoperative facial nerve function in acoustic neuroma patients

Introduction: Acoustic neuroma (AN) is the most frequent benign lesion in the posterior cerebral fossa, accounting for 80% of all tumours at the cerebellar pontine angle. With the use of cutting-edge microscopes, neuronavigation, intraoperative electrophysiological monitoring, and other technologies, resection-related problems and death rates have considerably decreased, while maintaining patient safety and maintaining facial nerve function remain the primary goals of surgery. Concern over the risk of postoperative facial paralysis, which can affect patients' social lives, is common among patients. Therefore, enhancing facial nerve function postoperatively while removing the maximum amount of tumour is the main objective.[1] Patients' prospects have dramatically improved in recent years as a result of significant advancements in neuroimaging, cranial nerve monitoring, and microsurgery. Poor postoperative facial nerve (FN) results have been linked to several causes. The size and volume of the tumour will specifically affect FN function, and studies have shown that FN performance suffers more adversely than expected after the excision of big tumours as opposed to tiny ones. A further association between postoperative FN outcomes and FN location and course pattern has been found.[2] The aim of this study was to develop and evaluate a predicted deep learning model for short-term postoperative facial nerve function in patients with acoustic neuromas using clinical data and multi-sequence magnetic resonance imaging (MRI).



Methods: This study included a total of 110 acoustic neuroma patients who had surgery using the retrosigmoid sinus technique. Four MRI sequences (T1-weighted, T1-weighted contrast enhancement, T2-weighted, and T2-weighted-flair images) were analysed for clinical information and raw characteristics. The combined clinical and radiomic characteristics were screened using Spearman correlation analysis, least absolute shrinkage, and selection operator regression. The prognosis of facial nerve function on the seventh postoperative day was predicted using nomogram, machine learning, and convolutional neural network (CNN) models.

Results: In this study, 110 acoustic neuroma patients were allocated into a training set (n = 77) and a test set (n = 33). A total of 1050 radiomic data were retrieved, and 13 radiomic and 3 clinical aspects were identified. The calibration curve was used to assess the nomogram model. The Light Gradient Boosting Machine (LightGBM) model was the most accurate in predicting the prognosis of FN function on the seventh day following surgery among the machine learning models that had been created. The test and training sets' respective AUC values were 0.76 (95% CI: 0.72-0.85) and 0.82 (95% CI: 0.67-0.84), respectively. AUC values of 0.89 and 0.95 in the test and training sets, respectively, were obtained by convolutional neural network (CNN) modelling. The CNN model exhibited higher accuracy and specificity in the test set and higher specificity in the training set. In terms of area under the curve (AUC), the CNN model outperformed all other prediction models in the test set. (Table.1)

Table.1: The performance of all model

Models	Accuracy		Sensitivity		Specificity		Precision		AUC (95%CI)	
	Test	Training	Test	Training	Test	Training	Test	Training	Test	Training
CNN	0.81	0.78	0.78	0.90	0.87	0.80	0.84	0.93	0.89 (0.84–0.91)	0.95 (0.87–0.98)
Nomogram	0.80	0.63	0.75	0.73	0.83	0.58	0.81	0.91	0.85 (0.74–0.87)	0.86 (0.78–0.88)
LightGBM	0.80	0.73	0.77	0.87	0.81	0.65	0.78	0.83	0.76 (0.72–0.85)	0.82 (0.67–0.84)
SVM	0.65	0.63	0.65	0.86	0.65	0.50	0.69	0.76	0.74 (0.64–0.77)	0.85 (0.82–0.87)
SGD	0.57	0.63	0.48	0.87	0.60	0.50	0.67	0.75	0.66 (0.65–0.71)	0.89 (0.81–0.91)
KNN	0.62	0.62	0.52	0.80	0.66	0.54	0.60	0.72	0.64 (0.61–0.75)	0.83 (0.76–0.90)
Decision tree	0.80	0.61	0.61	0.60	0.85	0.62	0.78	0.86	0.74 (0.66–0.78)	0.75 (0.71–0.80)
Random forest	0.77	0.73	0.48	0.80	0.86	0.69	0.82	0.89	0.70 (0.68–0.75)	0.82 (0.75–0.88)
Extra trees	0.73	0.76	0.42	0.73	0.83	0.77	0.70	0.83	0.66 (0.62–0.76)	0.72 (0.62–0.74)
Logistic regression	0.69	0.68	0.61	0.86	0.72	0.58	0.75	0.88	0.71 (0.66–0.73)	0.83 (0.72–0.88)

CNN: convolutional neural network; KNN: K-nearest neighbor; LightGBM: Light Gradient Boosting Machine; SGD: stochastic gradient descent; SVM: support vector machine

Discussion: This study showed that it is possible to predict the prognosis of postoperative facial nerve function with high accuracy by integrating radiomic signals and clinical factors. This model may accurately predict FN function due to its rich radiomic properties, which offer subtle and quantitative characteristics of tumour components, cystic or solid mass. According to the Yang HC et al. study, preradiosurgical MR radiomics can predict pseudo progression and long-term outcomes with an accuracy of 88.4% using five radiomic features that describe the variation of T2-weighted intensity and the identification of tumours.[3]

Conclusion: This study concludes that CNN modelling, which integrates clinical and multi-sequence MRI radiomic characteristics, performs exceptionally well in predicting short-term facial nerve function following surgery in acoustic neuroma patients. Convolutional neural network (CNN) modelling is a useful tool for making decisions in neurosurgery

A deep learning prediction model using clinical and radiomic characteristics for short-term postoperative FN function in patients with acoustic neuroma offers remarkable predictive performance.

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A study on the assessment of the impact of nasal septum deviation on the choroidal thickness

Introduction: Nasal congestion is a common symptom experienced by otolaryngologists and primary care physicians in clinical practise, and it can be caused by a range of reasons, including anatomical, physiological, and pathological. One of the most frequent reasons for obstruction of the upper airway is nasal septal deviation. Due to alveolar hypoventilation, the prolonged upper airway obstruction that results from this syndrome can cause chronic hypoxia or hypercarbia. The blockage may be persistent and severe and may cause compensatory inferior turbinate hypertrophy on the opposite side. This can enhance the surface area and blood supply of the inferior turbinate.[1] The posterior ciliary arteries supply the vascularized choroid, which receives around 90% of the total blood flow to the eye. The main source of oxygen and nutrients for the outer retina is the choroid's vasculature. The choroidal blood flow has the potential to cool and warm the retina. Being a vascular structure, the choroid is susceptible to systemic conditions like diabetes, chronic heart failure, and high blood pressure.[2] This study aimed to assess the connection between nasal obstruction and choroidal thickness.

Methods: In this prospective study, 144 patients diagnosed with nasal septum deviation and 100 healthy participants were involved. The patients were split into two groups, Group 1 and Group 2, with Group 1 consisting of 69 patients with a nasal septum deviation to the right and Group 2 consisting of 75 patients with a nasal septum deviation to the left, and 100 healthy participants in the control group. All individuals underwent thorough ophthalmological exams, and choroidal thickness was assessed using spectral domain optical coherence tomography.

Results: Among the 69 patients in Group 1, 34 were males and 35 were females. In Group 2, 38 were males and 37 were females. In the control group, the majority were healthy females compared to healthy males. Measurements of the choroidal thickness of the patient's in

Group1 showed that the choroidal thickness increased in all regions of the eye that were contralateral to the deviation side (left), and intraocular pressure (IOP) was increased compared to the eye that was on the deviation side (right) and the control group at a statistically significant level. In comparison to the deviation side (left) and the control group, Group 2 had larger choroidal thickness measures in all eye locations that were contralateral to the deviation side (right). (Table. 2)

Ocular Parameters	Right Eye	Left Eye	Control group	P value
Intraocular pressure (IOP)	15.69±1.355	13.55±1.266	13.34±1.719	0.000
Central corneal thickness (CCT)	532.83±22.450	533.51±24.017	532.68±21.480	0.866
Axial length (AL)	22.96±0.979	23.00±1.027	23.00±1.025	0.783
Visual acuity (VA)	9.76±0.489	9.80±0.465	9.79±0.478	0.602
Foveal center (FC)	368.19±71.163	336.63±66.751	338.77±59.183	0.005

Table 2: Measurements of the Group 2 patients' choroidal thickness and ocular characteristics

Discussion: In this study, the intraocular pressure (IOP) was greater in patients with nasal septum deviation than in the control group due to increased choroidal thickness in all areas of the eye on the side (right or left) opposite the deviation. Similar to the Sahin E. et al. study revealed a strong association between choroid thickness measures taken before and after septoplasty in individuals with nasal septum deviation. Choroid thickness considerably increased compared to preoperative values following septoplasty surgery at 3 months.[3]

Conclusion: This study concluded that individuals with a nasal septum deviation had greater choroidal thickness and IOP values in the eye across the deviation.

A choroidal layer examination and IOP measurements are recommended in patients with nasal septum deviation

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Evaluation of RSI and RFS scores to distinguish between reflux-related and other causes of chronic laryngitis

Introduction: Upper respiratory problems, including a painful throat, cough, throat clearing, difficulty swallowing, and hoarseness, are frequently accompanied by chronic laryngopharyngitis. There are a variety of allergic, inflammatory, or infectious factors that might cause it. Obstructive sleep apnea (OSA) and snoring are both conditions that are more common in obese people. The upper airway collapsing and causing friction between the pharynx, palate, tongue, and larynx mucosa can potentially result in mucosal damage that mimics an inflammatory or infectious occurrence. Obesity affects the immune system and promotes conditions like gastroesophageal reflux disease (GERD) and its supraesophageal symptoms (laryngopharyngeal reflux, or LPR).[1] Supraesophageal reflux (SERD), also known as laryngopharyngeal reflux (LPR), is the term used to describe the additional oesophageal signs and symptoms that can result from gastroesophageal reflux disease (GERD). The upper oesophageal sphincter's proximity to the larynx and pharynx allows for the reflux of both acidic and nonacidic components from the stomach. Asthma, vocal cord dysfunction, coughing, postnasal discharge, and sinusitis are upper and lower respiratory symptoms and illnesses that have been linked to LPR.[2] The aim of this study was to determine if the Reflux Symptom Index (RFI) and the Reflux Finding Score (RFC) are useful in the differential diagnosis of patients with several forms of chronic laryngopharyngitis.

Methods: In this prospective study, a total of 102 chronic laryngopharyngitis patients were included. Patients were divided into 3 groups: Group A: 37 patients with allergic rhinitis; Group B: 22 patients with obstructive sleep apnea (OSA); and Group C: 43 patients with laryngopharyngeal reflux (LPR). The diagnosis of chronic laryngitis was made on the basis of suggestive symptoms like sore throat, scratchy throat, hoarseness, throat clearing, postnasal drip, thick mucus in the throat without fever, malaise, or other systemic symptoms, lasting for more than 12 weeks, and videolaryngoscopic signs ($RSI \geq 13$ and $RFS \geq 7$). A positive serum RAST test was used to identify allergies, a positive polysomnography to identify OSA, and a positive impedance-PH test to identify LPR. The ability of the RSI and RFS scores to distinguish across groups was tested using discriminant function analysis.

Results: The mean RSI scores were 16.91 ± 8.40 in the LPR group, 16.38 ± 9.18 in the allergy group, and 7.59 ± 8.81in the OSA group. LPR group patients and respiratory allergies group had similar and significantly higher RSI scores compared to the OSA group ($p < 0.001$). (Figure.1) The mean RFS scores were 7.49 ± 2.72 for the allergy group, 10.23 ± 3.32 for the OSA group, and 10.65 ± 3.04 for the LPR group. LPR group patients and OSA group patients had similar and significantly higher RSI scores compared to the respiratory allergies group ($p < 0.001$). (Figure.2) Combining all scores increased the probability of detecting OSA (72.73%) and allergies (64.86%), but decreased the probability of diagnosing LPR (51.16%).

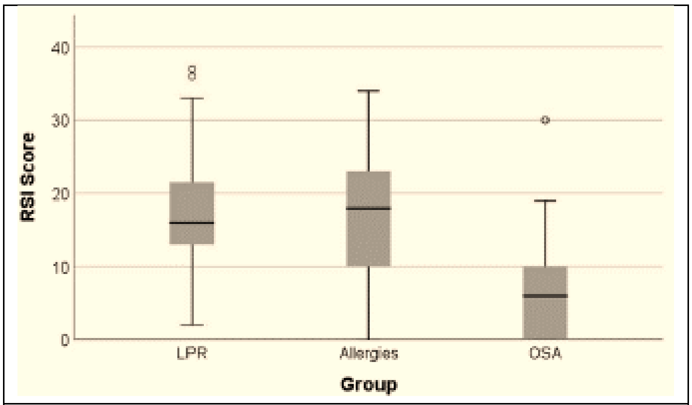

Figure.1: Box plot comparing RSI score between patients in the three sub-groups with chronic pharyngolaryngitis.

Discussion: When compared to patients with OSA, individuals with respiratory allergies and those with LPR in this study had similar and noticeably higher RSI values. According to research by Campanholo MD et al., the RSI score was not related to the severity of OSA. LPR was linked to older age, smoking, excessive daytime drowsiness, lower quality of life and sleep scores, and poorer questionnaire results.[3]

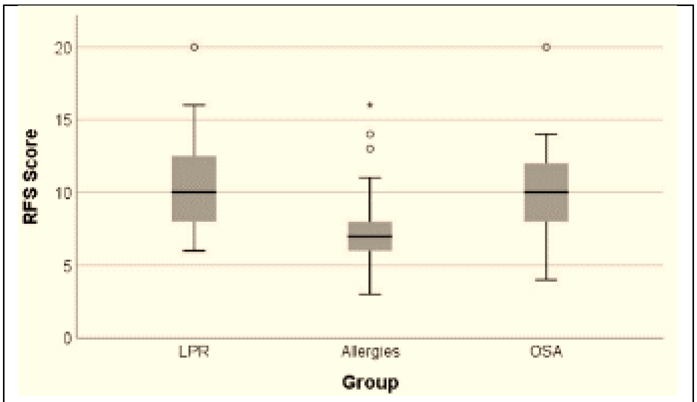

Figure.2: Box plot comparing RFS score between patients in the three sub-groups with chronic pharyngolaryngitis.

Conclusions: This study concludes that the RSI and RFS are not appropriate diagnostics for reflux laryngitis and are more likely to provide a false diagnosis if not utilised properly.

The Reflux Symptom Index and the Reflux Finding Score are less likely to identify reflux laryngitis and are more likely to lead to an incorrect diagnosis if not used properly.

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A case report on the pernicious effect of nasopharyngeal tuberculosis with unilateral hearing loss

Introduction: Extrapulmonary tuberculosis (EPTB) accounted for 17% of all newly reported tuberculosis infections in 2021 due to a continuous rise over the previous several years. It has been shown that 10 to 35% of EPTB cases present in the head and neck area, affecting many different tissues there, including the pharynx, larynx, salivary glands, and lymph nodes.[1] Only 1% of all recorded cases of EPTB in the area are nasopharyngeal tuberculosis, an uncommon form of head and neck tuberculosis. Less than 1% of cases of nasopharyngeal tuberculosis (NPTB) were found in the head and neck TB category.[2] The patient in this case had unilateral hearing loss along with nasopharyngeal TB. Following the end of anti-tuberculous treatment, all symptoms were fully resolved.

Case presentation: A 33-year-old female patient visited the hospital with complaints of tinnitus and left-sided progressive hearing loss for two weeks. An air-fluid level and a retracted tympanic membrane were found in the left ear during examination. Leucoplakia lesions were seen during a nasal endoscopic examination at the bilateral torus tubarius, with the left side being more predominant (Figure 3). Additionally, the bilateral nasal cavities had thick mucoid secretions.

Figure.3: Endoscopic examination of the nasopharynx reveals slough on the bilateral torus tubarius, mostly on the left side.

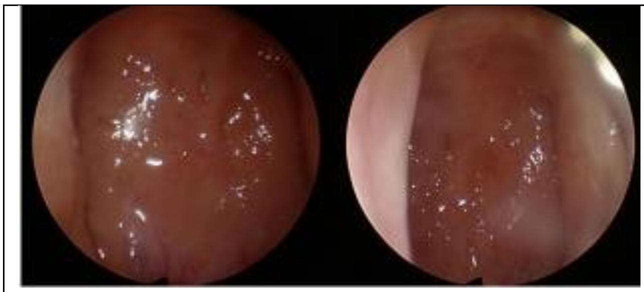

Figure.4: Endoscopic appearance of the nasopharynx (post-completion of anti-tuberculous treatment), showing resolution of nasopharyngeal lesions

A bilateral tubarius torus biopsy was performed. A histopathological analysis found no granuloma or dysplasia-related outcomes. Both mycobacterial culture and mycobacterium DNA polymerase chain reaction (PCR) tests on the tissue samples yielded positive results.

A baseline pure tone audiometry (PTA) was performed in response to the patient's complaints of hearing loss, and the results revealed left-sided mixed hearing loss with a right-ear hearing threshold that was normal. The patient completed a course of rifampicin, isoniazid, ethambutol, and pyrazinamide therapy for six months. After a follow-up visit, a nasal endoscopic examination indicated that all nasopharyngeal lesions had completely disappeared (Figure 4) and that the patient's left-sided hearing loss had returned to normal.

Discussion: In this study, the patient successfully completed 6-month anti-TB treatment, and symptoms reduced with normalisation of left-sided hearing loss. Zhang Z et al.'s study showed anti-TB medications were prescribed for 6 months; after 3 months of treatment, patients symptoms are reduced, and they are advised to visit an infectious diseases hospital for regular follow-up and discontinue the oral anti-TB drugs.[3] In the Özer M, et al. study, anti-TB drugs were prescribed for 6 months to patients with primary nasal TB, and after the treatment period, symptoms were reduced and the patient was advised to discontinue anti-TB drugs.[4]

Conclusion: This study revealed that nasopharyngeal TB may potentially harm the ossicular chain and inner ear components in addition to impairing middle ear airflow.

Hearing evaluation is important for monitoring any otological or audiological complications of Nasopharyngeal Tuberculosis.

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