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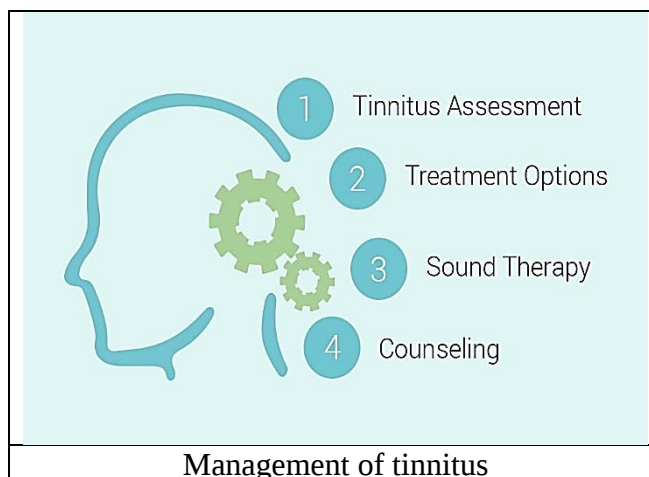
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Medical Team, Micro Labs

Investigation of structural and functional alterations in the thalamus and its subregions using multimodal magnetic resonance imaging (MRI) in tinnitus patients with different outcomes after sound therapy

Introduction: Tinnitus is a false auditory feeling that affects 4 to 15% of the global population and lowers quality of life. It has been linked to head and neck trauma, acute sensorineural hearing loss, ototoxic medication usage, listening loud music, and other illnesses that can impair hearing. Chronic tinnitus can cause a variety of issues, including cognitive issues, sleep disruptions, depression, and work-related issues.¹ Consequently, there was an immediate need for tailored and efficient therapeutic approaches. For patients suffering from tinnitus, a variety of therapeutic approaches have been employed, such as cognitive-behavioural therapy, sound therapy, tinnitus retraining therapy, medication, counseling, and repeated transcranial magnetic stimulation. However, the underlying neuropathological mechanism is still unknown, no therapy works well enough for every individual. Studies were focussed on how sound therapy could treat tinnitus. In addition, it has previously been demonstrated by functional and structural magnetic resonance imaging (MRI) that sound therapy was essential for reducing the clinical symptoms of tinnitus patients by normalizing abnormal brain reorganizations. This abnormality may indicate a decreased involvement of the noise-cancelling system. Furthermore, a previous study discovered that individuals with tinnitus can benefit from sound therapy due to aberrant functional connectivity (FC). There were 14 subregions in the thalamus that were associated with different brain activities. Particularly for tinnitus with varying prognoses after sound therapy, the precise contributions of various thalamic subregions to tinnitus and its secondary dysfunction, as well as the underlying mechanisms, remain unclear.²



The purpose of this study was to evaluate the clinical significance of structural and functional changes in the thalamus and its subregions using multimodal magnetic resonance imaging (MRI) in individuals with tinnitus who had varied responses to sound therapy (narrowband noise).

Methods: This prospective observational study included 57 healthy controls (HCs) and 60 patients with chronic tinnitus. In accordance with the effectiveness of their treatments, 28 patients were assigned to the effective group (EG) and 32 to the ineffective group. Each participant had five MRI measurements of the thalamus and its seven subregions, including fractional anisotropy, fractional amplitude of low-frequency fluctuation, gray matter volume, and functional connectivity (FC), which were compared across the groups.

Results: Patients in both groups had broad functional and diffusion abnormalities in the thalamus and many subregions, with more evident changes seen in the effective group. All tinnitus patients had aberrant FC when compared to HCs; FC variations between the two patient groups were only seen in the striatal network, auditory-related cortex, and limbic core area. Obtained a sensitivity of 71.9% and a specificity of 85.7% by combining the multimodal quantitative thalamic changes and using it as an imaging indicator to assess prognosis prior to sound therapy. (Table 1)

Thalamic subregions' properties	AUC	Sensitivity	Specificity	p-Value	Cutoff	PPV (%)	NPV (%)
R inferior frontal gyrus	0.675	0.438	0.964	0.02*	0.402	40.6	47.1
L supramarginal gyrus	0.770	0.781	0.714	0.000*	0.495	70.4	78.9
Combination	0.808	0.719	0.857	0.000*	0.576	81.5	77.7
Abbreviations: AUC, area under curve; L, left; NPV, negative predictive value; PPV, positive predictive value; R, right; ROC, receiver operator characteristic.							
*Bold values indicate p-Value <0.05.							

Table 1: Findings from the ROC curve analysis of the functional characteristics of the thalamic subregions as prognostic markers

Discussion: This study revealed that nearly the whole thalamus in the EG and IG had elevated fractional anisotropy (FA). This study's enhanced FA may be the consequence of a secondary, compensatory change in the neuronal connections between the thalamus and other limbic areas, leading to a new stable state.² According to Jaroszynski C et al., thalamo-parietal bundles showed elevated apparent fiber density and FA associated with tinnitus. Additionally, comparing the EG's enhanced FA in the left and right prefrontal subregions with the HCs' revealed more active functional integration, which included auditory-somatosensory-emotional plasticity in tinnitus.³

Conclusion: The current study concluded that patients with tinnitus who experienced varying outcomes showed comparable patterns of thalamic modifications, with more pronounced changes seen in the effective group. A combination of multimodal quantitative thalamic features, including aberrant FC changes, could be used to forecast tinnitus prognoses and screen patients before sound therapy.

Tinnitus prognosis may be predicted using a combination of multimodal quantitative thalamic features prior to sound therapy.

References:

1. Wei X et al. Neuroanatomical alterations in patients with tinnitus before and after sound therapy: a voxel-based morphometry study. *Frontiers in Neuroscience*. 2020 Sep 8;14:911.
2. Chen Q et al. Multimodal quantitative magnetic resonance imaging of the thalamus in tinnitus patients with different outcomes after sound therapy. *CNS Neuroscience & Therapeutics*. 2023 Dec;29(12):4070-81.
3. Jaroszynski C et al. Tracking white-matter brain modifications in chronic non-bothersome acoustic trauma tinnitus. *NeuroImage: Clinical*. 2021 Jan 1;31:102696.

Assessment of prognostic variables and overall survival in diabetic patients with invasive fungal rhinosinusitis

Introduction: Individuals diagnosed with uncontrolled diabetic mellitus (DM) are known to have impaired immune systems and are more vulnerable to infections. In addition to blocking the generation of polymorphonuclear cells, neutrophil migration, and the creation of neutrophil extracellular traps, hyperglycemia stimulates protein kinase C. Phagocytic activity and chemotaxis lose their efficacy.¹ Invasive fungal rhinosinusitis (IFRS) is a life-threatening condition with a mortality rate of 50–80% with severe consequences. The clinical manifestations of IFRS, which include headache, fever, face swelling, and discomfort, as well as signs of adjacent structure invasion such as ophthalmoplegia and vision difficulties, were comparable between the two most frequent fungus, aspergillosis and mucormycosis. Common consequences include cavernous sinus extension, angioinvasion, expansions into the orbit, and extensive tissue necrosis. The frequency of IFRS in diabetic individuals is rising in line with the prevalence of diabetes.² In contrast to patients with hematologic malignancy, another underlying immunocompromised condition, people with DM had a higher survival rate for

IFRS. One important element that should be taken into consideration while predicting the overall survival of diabetes patients with IFRS was their immunological condition. Positive therapeutic results were possible if the compromised immunological status can be restored.¹ The purpose of this study was to determine critical predictive markers for overall survival in diabetic patients with IFRS.

Methods: About 65 diabetic individuals with IFRS were included in this retrospective analysis. The overall survival rate was the study's primary outcome. The prognostic variables for overall survival were secondary outcomes. The time interval between the admission date and the death date or the final follow-up date was noted. Prognostic variables included advanced age, elevated HbA1C, ketoacidosis, white blood cell count, hyperglycemia, duration of diabetes mellitus, current use of diabetic medications, serum creatinine level, and the extensions of IFRS to the orbit, cavernous sinus, and intracranial cavity were all analyzed.

Results: Mucormycosis and aspergillosis were diagnosed in 35.4% and 35.4% of the patients, respectively. There was 21.5% mortality rate. Mortality was predicted by the IFRS expansions to the intracranial cavity (hazard ratio 3.4, 95% CI [1.1–11.3], $p = 0.05$) and cavernous sinus (hazard ratio 5.1, 95% CI [1.4–18.2], $p = 0.01$). The mortality risk was reduced by current diabetes medication use (hazard ratio 0.2, 95% CI [0.1–0.9], $p = 0.03$). The 6-month overall survival rates of patients with and without cavernous sinus extension were 51.4% and 83.6%, respectively ($p = 0.001$); with and without intracranial extension, 53.3% and 88.9%, respectively ($p = 0.001$); and with and without current diabetes medicines, 82.3% and 57.5%, respectively ($p = 0.045$). (Table 1)

Overall survival (%)	1 month	3 months	6 months	<i>p</i> -value
Intracranial extension	65.2	60.2	53.3	0.001
No intracranial extension	97.3	88.9	88.9	
Cavernous sinus extension	60.0	51.4	51.4	0.001
No cavernous sinus extension	93.3	86.4	83.6	
Current no use of diabetic medications	74.5	67.0	57.5	0.045
Current use of diabetic medications	89.3	82.3	82.3	

Table 1: Comparison of the overall survival of diabetic individuals with risk factors for invasive fungal rhinosinusitis at 1, 3, and 6 months to those without.

Discussion: Thirty-five percent of the patients in this study had aspergillosis, and thirty-five percent had mucormycosis. Acute IFRS was present in 56 individuals (86.2%), while chronic IFRS was present in 9 patients (13.8%). There was a 21.5% mortality rate. The 6-month overall survival rate for individuals with cavernous sinus extension was 51.4%, compared to 83.6% for patients without cavernous sinus extension.¹ According to a study by Nyunt TP et al., aspergillosis accounted for 24.2% of IFRS cases, whereas mucormycosis accounted for 62.9%. Acute IFRS was detected in 221 individuals (93.4%), while chronic IFRS was diagnosed in 17 patients (6.7%). The percentage of deaths was 31.8%. The cavernous sinus extension was found to be a significant risk factor by univariable logistic regression analysis.²

Sphenoid sinus involvement, posterior ethmoid sinus involvement, facial pain, impaired vision, and periorbital swelling were identified as predictive indicators for the risk factors of orbital problems in IFS patients. An organ or hematopoietic cell transplantation history was associated with a lower chance of survival for IFS patients; on the other hand, surgical intervention and elevated hemoglobin and albumin levels were associated with a higher chance of survival.³

Conclusion: The current study concluded that patients with DM had a higher risk of death when IFRS was extended to the cerebral cavity and cavernous sinus. The current use of diabetes medicines was the most important predictor of survival.

Controlling diabetes complications and restoring immunological dysfunction in order to improve patient survival.

References:

1. Nyunt TP et al. Overall survival and prognostic factors in diabetic patients with invasive fungal rhinosinusitis. *Asian Pacific Journal of Allergy and Immunology*. 2023 Dec 1;41(4):347-52.
2. Nyunt TP et al. Predictive factors for invasive fungal rhinosinusitis in diabetic patients: Systematic review and meta-analysis. *Asian Pac J Allergy Immunol*. 2021 Mar 1;39(1):1-8.
3. Chiang PT et al. A Multi-Institutional Database Review of Orbital Complications and Survival Outcomes in Adult Patients with Invasive or Non-Invasive Fungal Rhinosinusitis. *Journal of Fungi*. 2022 Nov 23;8(12):1239.

Evaluation of the Differences between Surgical Tracheostomy and Real-Time Ultrasound-Guided Percutaneous Dilatational Tracheostomy in Critically Ill Patients

Introduction: Tracheostomy is one of the most common operations performed in intensive care units (ICUs) and may become increasingly widespread as the need for intensive care services grows. Although open surgical tracheostomy (ST) is the conventional treatment, it has a relatively high risk of peristomal infections and perioperative hemorrhage. Percutaneous dilatational tracheostomy (PDT) was first used in 1985 and has subsequently become a regular bedside treatment. PDTs are more advantageous than open STs in terms of cost-effectiveness, shorter operation times, reduced bleeding-related mortality, and decreased risk of wound infection.¹ Bronchoscopy-guided PDT was extensively used because it can determine the location of the trachea during a puncture and prevent injury to the posterior tracheal wall. However, identifying cervical anatomical structures, including arteries or the thyroid, can be difficult and requires a professional to utilize a bronchoscope. However, because it can detect anatomical features, ultrasound-guided PDT (US-PDT) was anticipated to provide benefits such as portability and safety. Real-time ultrasound has been shown in several trials to offer advantages over bronchoscopy. However, there weren't many studies to compare ST with US-PDT.² The purpose of this randomized controlled trial was to establish the safety and efficacy of US-PDT in comparison to ST.

Methods: A total of 70 individuals who underwent ST or US-PDT were involved in this randomized controlled study. Patients were randomized into two groups: ST (n = 35) and US-PDT (n = 35). The US-PDT surgery was conducted using the Ciaglia Blue Rhino tracheostomy kit (Cook Medical Inc.). The best level of tracheal puncture was determined using real-time ultrasound after a local anesthetic injection and palpation marking of the anatomical landmarks. The ST was carried out according to procedure. After administering a local anesthetic, a horizontal skin incision was performed, and the trachea was exposed using a sharp and blunt dissection. Using a portable fiberoptic laryngoscope, the endotracheal placement of the T-tube was confirmed. Clinical features of the patient, procedure time and specifics, complications, length of ICU stay, amount of time needed to wean off artificial breathing, and hospital mortality were assessed.

Results: There were no significant differences in the groups in terms of age, gender, BMI, APACHE (Acute Physiology and Chronic Health Evaluation), or duration of intubation. Three patients in the US-PDT group and two in the ST group had anatomical issues. One patient from the ST group had limited neck extension. There was no statistically significant difference in the endotracheal tube size or intubation depth between the two groups. (Table 1) Compared to ST, the US-PDT technique consumed a shorter duration. Additionally, the US-PDT incision length was shorter than the ST (1.5 ± 0.5 cm vs. 1.8 ± 0.4 cm). The procedure time and the USG-guided E-tube repositioning time added together made the overall duration in the US-PDT group 6.9 ± 2.8 minutes, which was considerably less than in the ST group ($P = 0.001$). In the US-PDT group, the relocated E-tube depth was 18.0 ± 0.7 cm for males and 16.7 ± 1.3 cm for women ($P = 0.004$). Data on demographics, surgery specifics, complications, length of stay in the intensive care unit, time spent weaning off the ventilator, and hospital mortality did not show statistically significant differences.

Variable	ST (n=35)	US-PDT (n=33)	P-value
Age (yr)	67.7 $\pm$ 13.7	65.6 $\pm$ 13.8	0.516
Sex (male:female)	21:14	20:13	0.959
Body mass index (kg/m ²)	21.9 $\pm$ 5.0	22.3 $\pm$ 5.2	0.753
APACHE II score	21.5 $\pm$ 8.8	24.4 $\pm$ 9.7	0.214
Intubation period (day)	13.6 $\pm$ 9.8	14.3 $\pm$ 6.1	0.732
Anatomical difficulty	2	3	0.594
Limited neck extension	1	0	0.328
Intubation depth (cm)	22.9 $\pm$ 1.4	23.0 $\pm$ 1.5	0.622
Endotracheal tube size (mm)	7.8 $\pm$ 0.5	7.8 $\pm$ 0.5	0.722

Values are presented as mean $\pm$ standard deviation.

Table 1: Demographic information and data collected from patients prior to ST and US-PDT procedures

Discussion: The study conducted by Kang HT et al. revealed that even with ultrasound-guided tube repositioning, the US-PDT group's procedural time (5.2 ± 3.1 minutes) was considerably lower than the ST group's (10.5 ± 5.0 minutes) ($p < 0.001$). For patients who were at high risk or who were not able to be transported, US-PDT could be a viable substitute for ST.¹ The results of the current investigation indicated that the US-PDT procedure time was less than the ST procedure time. US-PDT can be performed safely and successfully in critically ill patients, and it may be a viable alternative to ST.² Sarıtaş A et al. demonstrated that ultrasound-guided percutaneous dilatational tracheostomy was a safe procedure with a low rate of complications, a short procedure duration, the ability to provide information about neck anatomy, and the ability to facilitate the prevention of vascular puncture for critically ill patients.³

Conclusion: The current study concluded that US-PDT has a comparable complication rate and a shorter procedure time than ST. It can be performed safely and effectively on critically ill patients, and it may be a viable alternative to ST.

In comparison to surgical tracheostomy, ultrasound-guided PDT (US-PDT) required less time during the surgery and a shorter incision.

References:

1. Kang HT et al. Comparison between real-time ultrasound-guided percutaneous tracheostomy and surgical tracheostomy in critically ill patients. *Critical Care Research and Practice*. 2022 Sep 25;2022: 1388225.
2. Kim SY et al. Comparison between Real-Time Ultrasound-guided Percutaneous Dilatational Tracheostomy and Surgical Tracheostomy in critically ill Patients: A Randomized Controlled Trial. *Clinical and Experimental Otorhinolaryngology*. 2023 Nov;16(4):388-394.
3. Sarıtaş A et al. Comparison of bronchoscopy-guided and real-time ultrasound-guided percutaneous dilatational tracheostomy: safety, complications, and effectiveness in critically ill patients. *Journal of Intensive Care Medicine*. 2019 Mar;34(3):191-6.

Case report on fungal laryngitis: a neglected illness that mimics laryngeal cancer

Introduction: Fungal laryngeal infection is a rare phenomenon that was more common in immunocompromised people, accounting for roughly 40 recorded instances in clinical studies. Individuals with diabetes mellitus, broad-spectrum antibiotic medications, steroid administration, chemotherapy, and mechanical, chemical, or thermal disruption to the mucosal barrier have all been reported. A fungal infection may manifest as a superficial fungal infection on the larynx's mucosal surface or as a mucosal invasion, which can have more detrimental effects.¹ Fungal laryngitis can manifest in a variety of ways, including stridor, dysphagia, dysphonia, hoarseness, and respiratory discomfort. Misdiagnosis due to nonspecific clinical manifestations mimicking other laryngeal disorders may result in incorrect treatment. Because, treatment for fungal infections in rare places like the larynx varies, doctors and otolaryngologists should be aware of the presentation and diagnosis.² This case presents a fungal laryngitis that mimics laryngeal carcinoma.

Case presentation: A 60-year-old man with bronchial asthma and underlying diabetes mellitus was admitted to the hospital because he had been experiencing hoarseness and dysphagia for the previous five months, along with a globus sensation over his throat. An esophagogastroduodenoscopy (OGDS) conducted predominantly by the surgical team revealed a fungating mass across the supraglottic region, partially restricting the upper airway. A review revealed that the patient did not have respiratory distress or an

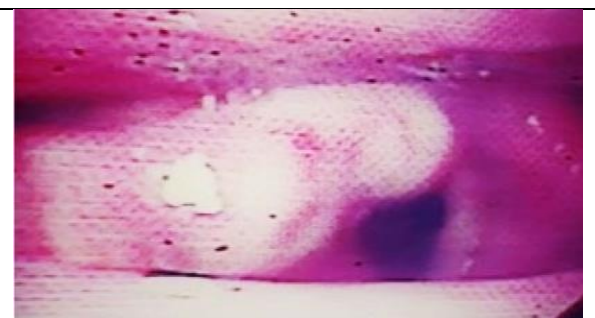


Figure 1: Endoscopic examination of the larynx revealing a fake chord and a fungating mass with a slough at the right arytenoid.

audible stridor. There were no palpable cervical lymph nodes. Endoscopic examination of the pharynx and larynx revealed a fungating mass at the right arytenoid spreading anteriorly to the posterior 1/3 of the right false cord with normal vocal cord mobility (Figure 1).

After a biopsy, the lump was found to be a fungal spore without any cancer cells. The patient was diagnosed with fungal laryngitis instead of laryngeal cancer after obtaining findings from numerous tests. Following that, the patient had a three-month course of oral antifungal therapy (Fluconazole). He reacted favorably to therapy, and a follow-up examination revealed that the lesion had healed (Figure 2). A surveillance endoscopy was performed on the patient at a subsequent follow-up appointment every month, and the results were unremarkable.



Figure 2: Endoscopic image of the larynx revealing resolved fungal laryngitis after treatment

Discussion: In this case, the patient's condition significantly improved in just two weeks after starting on 200 mg of oral fluconazole once a day for 30 days.² Systemic antifungals were used as a long-term treatment for fungal laryngitis. Based on available studies, the recommended course of action was to administer fluconazole at a dose of 100–400 mg daily. Because, this oral treatment has a better rate of absorption and was the basic medication of choice for individuals with candida infections. Treatment durations ranging from 10 to 30 days were possible, with noticeable clinical outcomes.³

Conclusion: Patients who had risk factors and were immunocompromised or immunocompetent, fungus laryngitis should be taken into account as a differential diagnosis. The anatomical and functional characteristics of the larynx may be compromised if this was not done. It was essential to do a biopsy combined with a histological analysis using certain stains in order to rule out malignancy and avoid misdiagnosis and maltreatment, both of which could be harmful to the patient.

Early diagnosis and therapy were essential because postponing or misdiagnosing a treatment could worsen the larynx's functional and structural characteristics.

References:

1. Singh K et al. Fungal laryngitis causing airway compromise in post irradiated patient. Acta Oto-Laryngologica Case Reports. 2016 Jan 1;1(1):123-5.
2. Srinivasagam K et al. Fungal laryngitis: a forgotten disease mimicking laryngeal cancer—a case report. The Egyptian Journal of Otolaryngology. 2023 Dec;39(1):1-4.
3. Mesolella M et al. Laryngeal candidiasis mimicking Supraglottic carcinoma by prolonged inhaled steroid therapy: a case report and review of the literature. Ear, Nose & Throat Journal. 2021 Sep; 100(5_suppl):761S-5S.



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