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# Bengal Journal of Otolaryngology and Head Neck Surgery

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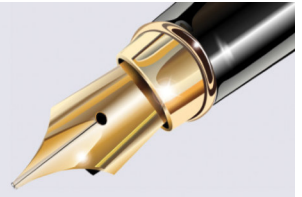
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## *From the Desk of the Editor*



Skull base osteomyelitis is a complex and fatal clinical entity. It occurs as a complication of otologic or rhinologic infection in immunocompromised patients. Though it was a rare condition in the past, recently there is increasing incidence of the disease. Most of the patients are diagnosed in late stage. The disease often starts with non-specific symptoms like discharge from ear or nose, pain in ear or face, headache, etc. Later on when the disease is far advanced, it produces cranial neuropathies, meningitis, vascular thrombotic events etc. Previously the commonest causative microorganism was *Pseudomonas aeruginosa* followed by *Aspergillus* species. But there are increasing reports of involvement of atypical and resistant microorganisms. Now we are getting disease involving both lateral and central skull base or central and bilateral lateral skull base simultaneously. There is no uniform treatment protocol of skull base osteomyelitis. Generally treatment involves deep biopsy, surgical debridement, and culture directed antibiotic or antifungal. But there is no definite guideline regarding boundaries of surgical debridement. Often aggressive surgical debridement increases the morbidity and mortality of the patients. The duration of treatment is very long which has significant impact on socio-economic conditions. Also there is no definite investigation to tell us about the prognosis and complete cure. So the problem of management of skull base osteomyelitis is multifactorial. First, we should investigate the reason behind increase in incidence of the disease and also increase in atypical and drug resistant cases, whether there is any role of COVID-19 pandemic. We should raise awareness of this fatal disease among all including the stakeholders. We should build a uniform treatment guideline including region specific antibiotic/antifungal regimen. We should also search for proper investigation(s) which should be available for these unfortunate patients.

Dr Chiranjib Das

Editor

Bengal Journal of Otolaryngology and Head Neck Surgery

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# An Observational Study of Anatomical Variations of Ostiomeatal Complex affecting Mucociliary Clearance

<https://doi.org/10.47210/bjohns.2026.v34i1.276>

Lavanya Reddy Yannamreddy,<sup>1</sup> Anil S Kumar Harugop,<sup>2</sup> Lakshmi Goswami,<sup>3</sup> Dhivya Bharathi Narasimman,<sup>4</sup> Puneeth Nayak S<sup>5</sup>

## ABSTRACT

### Introduction

The ostiomeatal complex (OMC) is vital for sinus drainage and mucociliary clearance. Anatomical variations like deviated nasal septum (DNS) and concha bullosa may predispose to chronic rhinosinusitis (CRS). This study assessed the impact of DNS severity and variations on sinus involvement using Lund-Mackay (LM) scores.

### Materials and Methods

A retrospective study of 73 patients (>18 years) undergoing Computed Tomography (CT) of paranasal sinuses was conducted. DNS was graded as: I (<5°), II (5–10°), III (10–15°), IV (>15°). Anatomical variations were recorded, and LM scoring applied to all sinuses and OMC. Statistical analysis included Spearman correlation and Chi-square test ( $p < 0.05$  significant).

### Results

Mean age was  $38.8 \pm 13.6$  years; 58.9% had right-sided DNS. Concha bullosa was most common ( $n = 57$ ). Right DNS strongly correlated with ipsilateral anterior ethmoid sinuses ( $Rho = 0.578, p < 0.01$ ) and sphenoid ( $Rho = 0.460, p < 0.01$ ) sinuses; left DNS correlated with anterior ethmoid ( $Rho = 0.463, p < 0.01$ ) and maxillary ( $Rho = 0.311, p < 0.05$ ). Chi-square the line analysis showed significant associations for all right-sided sinuses and for left anterior ethmoid and maxillary sinuses. OMC obstruction was linked to markedly higher LM scores across ipsilateral sinuses.

### Conclusion

DNS severity and OMC obstruction significantly affect sinus disease, especially anterior ethmoid and maxillary regions. Common anatomical variants did not independently predict severity. Preoperative CT evaluation should emphasize DNS and OMC for optimal CRS management.

### Keywords

Deviated Nasal Septum; Ostiomeatal Complex; Chronic Rhinosinusitis; Lund-Mackay; CT PNS

Nasal cavities and paranasal sinuses are characterized by high inter-individual anatomical variability.<sup>1</sup> The ostiomeatal complex (OMC) serves as a crucial drainage pathway for frontal, maxillary, and anterior ethmoid sinuses. Disruption in mucociliary clearance at this region predisposes patients to chronic rhinosinusitis (CRS).<sup>2</sup> Several anatomical variations, including deviated nasal septum (DNS), concha bullosa, and others, have been implicated in impaired sinus ventilation and drainage and the incidence of these anatomic variations varies among different populations.<sup>3</sup>

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Despite extensive literature, the impact of DNS severity on sinus involvement, particularly at the OMC, remains debated. This study aims to assess the relationship between anatomical variations and mucociliary clearance using Lund-Mackay scoring in the population of North Karnataka.

### Materials and Methods

It is a hospital based retrospective observational study done in the Department of Otorhinolaryngology at a tertiary care centre in North Karnataka for a period of 1 year. 73 patients above 18 years of age who underwent coronal CT scan of paranasal sinuses were taken into study. Any patients with conditions which adversely influence anatomy of nasal cavity like previous surgical history, invasive fungal sinusitis, malignancy of PNS and trauma etc. were excluded from the current study. CT scan was performed by a 128-slice GE machine. Contiguous axial and coronal scans of 3mm slice thickness were taken from frontal sinus to sphenoid sinus. All films are taken without contrast.

Deviated nasal septum (DNS) severity was graded as: Grade I ( $<5^\circ$ ), Grade II ( $5-10^\circ$ ), Grade III ( $10-15^\circ$ ), Grade IV ( $>15^\circ$ ). Anatomical variations (Aggar nasi, concha bullosa, etc.) were documented. Lund Mackay (LM) scoring was applied for sinuses and OMC. Statistical analysis included descriptive statistics, Spearman correlation for DNS vs LM scores, and Chi-square tests for DNS grades vs LM subscores. A p-value  $<0.05$  was considered significant.

### Results

A total of 73 patients were included in this observational study, with a mean age of  $38.8 \pm 13.6$  years. The gender distribution was 40 males and 33 females. DNS was observed on the right side in 43 patients (58.9%) and on the left side in 30 patients (41.1%). When graded based on the degree of deviation:

- Right DNS: Grade I:  $n = 12$ , Grade II:  $n = 29$ , Grade III:  $n = 2$ .

- Left DNS: Grade I:  $n = 7$ , Grade II:  $n = 15$ , Grade III:  $n = 8$ .

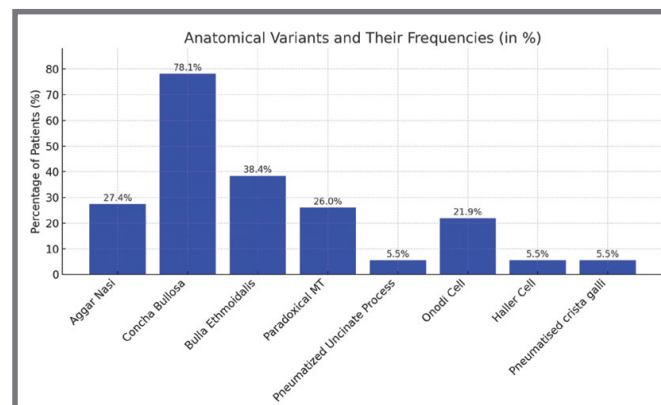
**Table I : Distribution of Deviated Nasal Septum (DNS) by Side and Severity**

	RIGHT DNS (43)	LEFT DNS (30)
Grade I ( $<5^\circ$ )	12	7
Grade II ( $5-10^\circ$ )	29	15
Grade III ( $10-15^\circ$ )	2	8
Grade IV ( $>15^\circ$ )	0	0

#### Anatomical Variations:

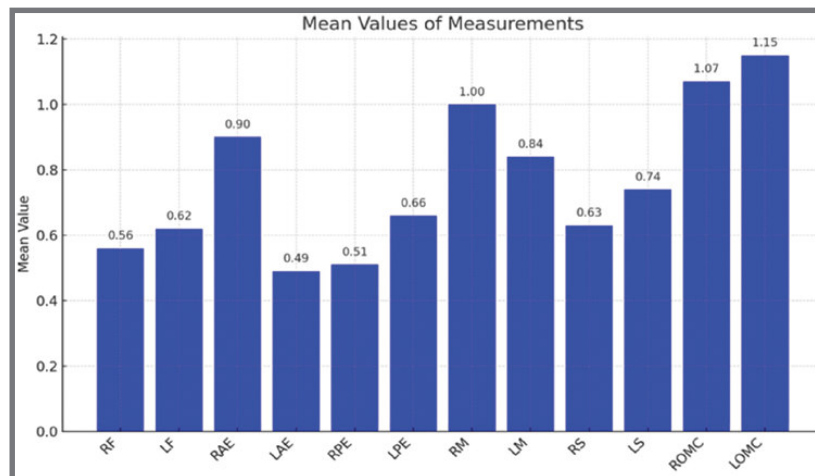
The most prevalent variation was concha bullosa (right: 38.4%, left: 39.7%). Followed by Aggar nasi and bulla ethmoidalis. Combined frequencies for key variations were Aggar Nasi ( $n = 20$ ), Concha Bullosa ( $n = 57$ ), Bulla Ethmoidalis ( $n = 28$ ), Paradoxical MT ( $n = 19$ ), Pneumatized Uncinate Process ( $n = 4$ ), Onodi Cell ( $n = 16$ ), Haller Cell ( $n = 4$ ), Pneumatized Crista Galli ( $n = 4$ ).

#### Lund-Mackay Score Analysis:



**Fig. 1. . Frequency of Anatomical Variations in the Ostiomeatal Complex**

The Lund-Mackay (LM) score was evaluated for all paranasal sinuses, with a particular emphasis on the ostiomeatal complex (OMC). In this study, the mean OMC score was approximately  $1.07 \pm 1.00$  on the right and  $1.15 \pm 1.00$  on the left, indicating that around half of the patients exhibited some degree of obstruction at this level. Among all measured regions, OMC showed the highest mean scores, followed by the maxillary sinuses, whereas frontal and ethmoid regions generally had lower scores.



**Fig. 2. Mean Lund-Mackay Scores Across Paranasal Sinuses**

#### Correlation Between DNS and LM Scores:

Spearman's rank correlation revealed strong, statistically significant positive correlations between DNS severity and ipsilateral sinus involvement, particularly for the right side:

- Right DNS: RAE ( $\tilde{n} = 0.578$ ,  $p < 0.01$ ), LAE ( $\tilde{n} = 0.505$ ,  $p < 0.01$ ), RS ( $\tilde{n} = 0.460$ ,  $p < 0.01$ ), and RF ( $\tilde{n} = 0.392$ ,  $p < 0.05$ ).

- Left DNS: LAE ( $\tilde{n} = 0.463$ ,  $p < 0.01$ ) and LM ( $\tilde{n} = 0.311$ ,  $p < 0.05$ ).

Contralateral correlations were weak and did not reach statistical significance.

#### Chi-square Analysis:

A Chi-square test was performed to evaluate the association between DNS grades (I–IV) and Lund-Mackay subscores for individual sinuses:

- Right DNS demonstrated a significant association with ipsilateral sinus involvement, including the frontal, anterior ethmoid, posterior ethmoid, maxillary, and sphenoid sinuses ( $p < 0.05$  for all).

- Left DNS also showed significant associations with anterior ethmoid and maxillary sinuses ( $p < 0.05$ ), confirming that severe deviation on the left side influences disease in these regions.

**Table II : Association Between DNS Severity and Lund-Mackay Sinus Scores (Chi-square Analysis)**

SIDE OF DNS	SINUS	CHI2	DF	P-VALUE
Right	RF	13.22	4	0.010
Left	LF	6.31	4	0.177
Right	RAE	14.42	6	0.025
Left	LAE	18.71	4	0.0009
Right	RPE	10.52	4	0.032
Left	LPE	3.37	4	0.496
Right	RM	10.25	4	0.036
Left	LM	16.08	4	0.002
Right	RS	16.21	4	0.002
Left	LS	6.84	4	0.144

### Correlation of OMC Obstruction with Ipsilateral Sinus Scores

The mean LM scores for ipsilateral sinuses were significantly higher when the ostiomeatal complex (OMC) was obstructed (score = 2) compared to when it was patent (score = 0). For the right side, OMC obstruction resulted in mean scores of Frontal: 1.4, Anterior Ethmoid: 1.8, Maxillary: 1.9, whereas these values were markedly lower when the OMC was patent (Frontal: 0.3, Anterior Ethmoid: 0.6, Maxillary: 0.4). A similar trend was observed on the left side (Frontal: 1.2 vs 0.4; Anterior Ethmoid: 1.7 vs 0.5; Maxillary: 1.8 vs 0.6). Spearman correlation analysis revealed a moderate to strong positive correlation between OMC obstruction and ipsilateral sinus involvement:

- Right side:  $r = 0.45-0.68$  (strongest for anterior ethmoid and maxillary).
- Left side:  $r = 0.40-0.62$  (strongest for anterior ethmoid and maxillary).

This indicates that OMC blockage is strongly associated with higher LM scores and more severe sinus disease.

### Discussion

The present study investigated anatomical variations of the ostiomeatal complex (OMC) and their impact on mucociliary clearance using LM Scores. Our findings confirm that DNS severity significantly correlates with ipsilateral sinus involvement, particularly the anterior ethmoid and maxillary sinuses. This is consistent with the pathophysiological understanding that septal deviation can alter nasal airflow, compromise ventilation, and impair mucociliary clearance.<sup>4</sup>

Several studies have demonstrated a significant association between DNS and chronic rhinosinusitis (CRS) severity. Zahraa H Alsaggaf et al,<sup>5</sup> reported that marked septal deviations are often associated with ipsilateral maxillary and ethmoid sinus disease, which aligns with our observation of a strong positive correlation between DNS grade and anterior ethmoid involvement ( $\tilde{r} = 0.578$ ,  $p < 0.01$ ). Similarly, Elahi MM et al.<sup>6</sup> and E Scribano et al.<sup>7</sup> highlighted that severe DNS ( $>10^\circ$ )

predisposes patients to obstruction at the OMC, increasing LM scores for the maxillary and ethmoid sinuses.

In the present study, right-sided DNS demonstrated stronger and more frequent significant associations compared to the left. However, after targeted analysis, we observed that severe left-sided DNS also significantly affected the left anterior ethmoid and maxillary sinuses, supporting the role of deviation severity rather than side dominance and we attribute this association to nasal anatomical asymmetry.

Our data confirm the importance of the OMC as a critical site for disease progression. Nearly 50% of our cohort exhibited obstruction at the OMC (LM = 2), emphasizing its role as a functional bottleneck, in agreement with Aramani A et al<sup>8</sup> and Kennedy D<sup>9</sup> who described the OMC as the primary drainage pathway whose obstruction leads to widespread sinus involvement.

Our findings demonstrate that obstruction of the OMC significantly increases ipsilateral sinus involvement. Patients with OMC blockage had substantially higher LM scores across all ipsilateral sinuses, with the greatest effect observed in the anterior ethmoid and maxillary regions. Obstruction at this level acts as a critical point of failure, resulting in muco-stasis and widespread disease. This reinforces the clinical principle that restoring OMC patency should be a primary surgical goal in functional endoscopic sinus surgery (FESS).

The frequency of anatomical variants in our population mirrors findings by Bolger et al.,<sup>10</sup> where concha bullosa and Aggar nasi were the most common. However, in our multivariate analysis, these variations did not independently predict sinus disease severity, consistent with Fadda et al.,<sup>11</sup> who concluded that while common, these variants act as contributory rather than primary etiological factors. Some authors, such as Daniel Aliyu et al.,<sup>12</sup> have reported significant associations between concha bullosa and CRS severity, which contrasts with our findings. This discrepancy may be attributed to differences in study populations, sample size, or classification criteria for variations. Our data suggest that septal deviation and OMC obstruction play a more dominant role than isolated variants.

## Conclusion

This study highlights the significant influence of anatomical variations on sinus disease patterns. Deviated nasal septum (DNS) severity demonstrated strong correlations with ipsilateral sinus involvement, particularly affecting the anterior ethmoid and maxillary sinuses. Although common variations like concha bullosa and Aggar nasi were frequently noted, they did not independently correlate with disease severity. This may be due to differences in study populations, as these variations have been reported to significantly influence outcomes in populations of other ethnic groups. Most importantly, obstruction of the ostiomeatal complex (OMC) showed a strong association with increased Lund-Mackay scores across all ipsilateral sinuses, confirming its critical role in mucociliary clearance. These findings highlight the need for thorough preoperative evaluation tailored to different populations and ethnic groups, along with functional surgical approaches that focus on correcting DNS and restoring OMC patency to optimize outcomes in the management of chronic rhinosinusitis.

## References

1. Cellina M, Gibelli D, Cappella A, Martinenghi C, Belloni E, Oliva G. Nasal cavities and the nasal septum: Anatomical variants and assessment of features with computed tomography. *Neuroradiol J* [Internet]. 2020 Aug 1 [cited 2025 Aug 25];33(4):340
2. Bandyopadhyay R, Biswas R, Bhattacharjee S, Pandit N, Ghosh S. Osteomeatal Complex: A Study of Its Anatomical Variation Among Patients Attending North Bengal Medical College and Hospital. *Indian Journal of Otolaryngology and Head & Neck Surgery* [Internet]. 2015 Sep 26 [cited 2025 Aug 25];67(3):281
3. Mokhasanavisu VJP, Singh R, Balakrishnan R, Kadavigere R. Ethnic Variation of Sinonasal Anatomy on CT Scan and Volumetric Analysis. *Indian Journal of Otolaryngology and Head & Neck Surgery* [Internet]. 2019 Nov 1 [cited 2025 Aug 25];71(Suppl 3):2157
4. Jang YJ, Myong NH, Park KH, Koo TW, Kim HG. Mucociliary Transport and Histologic Characteristics of the Mucosa of Deviated Nasal Septum. *Arch Otolaryngol Head Neck Surg* [Internet]. 2002 Apr 1 [cited 2025 Aug 25];128(4):421–4
5. Alsaggaf ZH, Almadfaa AO, Marouf AA, Alfawaz KS, Niyazi RA, Ibrahim NK, et al. Sinusitis and its association with deviated nasal septum at a tertiary hospital: A retrospective study. *J Taibah Univ Med Sci* [Internet]. 2022 Dec 1 [cited 2025 Aug 25];17(6):1065
6. Elahi MM, Frenkiel S. Septal Deviation and Chronic Sinus Disease. *Am J Rhinol* [Internet]. 2000 [cited 2025 Aug 25];14(3):175–9
7. Scribano E, Ascenti G, Loria G, Cascio F, Gaeta M. The role of the ostiomeatal unit anatomic variations in inflammatory disease of the maxillary sinuses. *Eur J Radiol* [Internet]. 1997 May [cited 2025 Aug 25];24(3):172–4
8. Aramani A, Karadi RN, Kumar S. A Study of Anatomical Variations of Osteomeatal Complex in Chronic Rhinosinusitis Patients-CT Findings. *J Clin Diagn Res* [Internet]. 2014 [cited 2025 Aug 25];8(10):KC01
9. Kennedy DW. Pathogenesis of chronic rhinosinusitis. *Annals of Otolaryngology, Rhinology and Laryngology* [Internet]. 2004 [cited 2025 Aug 25];113(5 II):6–9
10. Bolger WE, Parsons DS, Butzin CA. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. *Laryngoscope* [Internet]. 1991 Jan [cited 2025 Aug 25];101(1):56–64
11. Fadda GL, Rosso S, Aversa S, Petrelli A, Ondolo C, Succo G. Multiparametric statistical correlations between paranasal sinus anatomic variations and chronic rhinosinusitis. *Acta Otorhinolaryngologica Italica* [Internet]. 2012 Aug [cited 2025 Aug 25];32(4):244
12. Jh S, Kr I, Aliyu D, Yikawe S. Endoscopic assessment of the nasal anatomical variations in adult patients with chronic rhinosinusitis in Sokoto, Nigeria. *IOSR J Dent Med Sci*. 2018;17(10):68-71



# Significance of Tissue Eosinophilia and Zinreich CT Scan Scoring in Nasal Polyposis

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## ABSTRACT

### Introduction

Chronic Rhinosinusitis with nasal polyp is a chronic inflammatory condition of sinuses and nasal cavity characterized by the presence of benign and hyperplastic overgrowths called nasal polyps. Nasal tissue eosinophilia can predict the disease severity and prognosis of the disease. In this study an attempt has been made to find an association between nasal tissue eosinophilia and Zinreich CT scan scoring.

### Materials and Methods

This observational study was conducted at a tertiary care centre involving 40 patients with nasal polyposis underwent Functional endoscopic sinus surgery. All patients underwent pre operative CT scan and modified Lund MacKay (Zinreich) score were calculated. Excised polyp tissues were sent for Histopathologic examination and eosinophil count was calculated per high power field (400 X). Eosinophil count was categorized into two groups ( $\leq 10$  E/HPF) and ( $> 10$  E/HPF). We found that 15 patients had  $\leq 10$  E/HPF and 25 patients had  $> 10$  E/HPF with mean CT scoring of  $24.13 \pm 8.991$  and  $37.88 \pm 9.799$  respectively.

### Results

In our study out of 40 patients 7 had undergone FESS previously and 33 patients were undergoing FESS first time. It was found that 10 patients who had not undergone FESS previously had 0-5 eosinophils per high power field. 6 out of total 40 patients who had undergone FESS previously had more than 10 eosinophils per high power field.

### Conclusion

There was moderate degree of correlation between nasal eosinophilia and CT scoring with  $p$  value  $< 0.0001$ . The no of eosinophils per HPF in histopathological specimen is an important diagnostic modality to predict the recurrence of nasal polyps after FESS.

### Keywords

Nasal polyp; Eosinophilia; CT

Chronic Rhinosinuitis with nasal polyp is characterized by a Th2- skewed eosinophilic inflammation while Chronic Rhinosinustis without nasal polyp presents a predominant Th1 milieu in Western countries.<sup>1</sup>

Mucosal eosinophilic status provides certain prognostic information about disease severity or outcome.

CRSwNP patients with mucosal eosinophilia show significantly less improvement in quality of life after FESS.

In Western countries, mucosal eosinophilia is defined as  $>5$  or  $>10$  eosinophils per high-power field (HPF)<sup>2,3</sup> while in Japan mucosal eosinophilia is defined as  $\geq 70$ ,  $>100$ , or  $>120$  eosinophils per HPF.<sup>4,5,6</sup> Thus, diagnosis of eosinophilic infiltration is different among countries and facilities, and there is no consensus.<sup>7</sup> CT scan is one of the diagnostic modality to know the extent of disease and acts as a roadmap during the FESS. Lund Mac Kay is a standard system for evaluating CRS on CT scans scoring six sinuses on either side. The Zinreich

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soring system is a method used in conjunction with the Lund Mackay system to assess the severity of inflammation in Chronic Rhinosinusitis with nasal polyps on Computed tomography scans. It focusses on the degree of sinus opacification, particularly in the ethmoid sinuses and provides a more detailed assessment than the basic LM score.

The modified Lund Mc Kay (Zinreich) staging systems showed more efficient ability to gradate in evaluating rhinosinusitis inflammation compared with the L-M system and also showed acceptable accuracy.<sup>8</sup>

An attempt was made to find association between the eosinophil count per high per field in specimen of nasal polyp for all the patients who underwent FESS with the modified Lund Mac Kay(Zinreich scoring)

In a study in which a tissue eosinophil count of >10/HPF was histopathologically defined as ECRS, Snidvang et al.<sup>9</sup> compared non-ECRS patients with ECRS patients and demonstrated that endoscopic and CT scores were more severe in the ECRS patients. Based on the study outcomes, they concluded that tissue eosinophilia could be a good marker of CRS, regardless of its subtypes.

In this study we also tried to show the significance of eosinophil count in nasal polyp tissue in patients who had recurrent nasal polyps after undergoing FESS previously.

#### Aims and Objectives :

1. To assess the significance of association with nasal tissue eosinophil count and Modified Lund -Mckay (Zinreich)scoring in CT scan.
2. To determine degree of nasal polyp eosinophilia in patients who had undergone FESS previously.

#### Materials and Methods

This is an Observational study which included all patients who were diagnosed CRS w NP who had failed medical management and had elected to undergo FESS were enrolled in the study. Medical management included four weeks of topical nasal corticosteroid spray.

Preoperative demographic and medical history was

obtained which included age, sex, history of prior sinus surgery for nasal polyps. Diagnostic Nasal Endoscopic examination was done in OPD and the diagnosis was confirmed. CT scans in the coronal plane were obtained preoperatively and evaluated by using the Modified Lund-Mackay CT (Zinreich) scoring system (0-54 point scale).

The Modified Lund-Mackay score was used for the radiologic quantification of CRS severity. The sinuses were grouped into the frontal sinus, anterior ethmoidal cells, posterior ethmoidal cells, maxillary sinus, sphenoid sinus, and ostiomeatal complex. In the modified staging score ranging from 0-5 was given based on percentage of sinus opacification caused by mucosal thickening.

- 0%
- <25%:1 point
- 26-50%:2 points
- 51-75%:3 points
- 76-99%: 4 points
- 100%: 5 points

The osteomeatal complex is scored differently:

- 0 (normal)
- 1 (partially obstructed)
- 2 (completely obstructed)

Patients after undergoing FESS the tissue sample was taken from the nasal polyp and sent for Histopathological examination.

The sections obtained from the paraffin blocks of surgical materials, which were fixed with formaldehyde, were stained using hematoxylin and eosin. In these sections, mucosal eosinophil count was performed using high-power field (HPF, 400×)

Two patterns were recognized depending on the eosinophil count: (1).>10 eosinophils per field) and (2) <=10eosinophils per field.

The significance of Modified Lund-MacKay CT score with nasal tissue eosinophilia was investigated. The degree of nasal tissue eosinophilia in patients with recurrent nasal polyps who had previously undergone FESS was noted.

## Results

Out of 40 patients who participated in the study, the mean age of the patient was 40.83 with standard deviation 15.21

**Table I : Age Distribution**

	TOTAL (N = 40)
Age	
Number	40
Mean (Sd)	40.83 (15.211)
Median	39.00
Q1, Q3	30.00, 52.50
Min, Max	17.0, 84.0

Among 40 patients 13 (32.5%) were female and 27 (67.5%) were male patients

**Table II : Gender Distribution**

	TOTAL (N = 40)
Gender, n (%)	
Female	13 (32.5)
Male	27 (67.5)

For the 40 patients who were included in the study the mean CT scoring was 32.73 with standard deviation 11.55. Out of 40 patients 33 patients were undergoing FESS first time and 7 patients had undergone FESS previously. 7 patients who had undergone FESS previously had mean CT scoring of 38 which was higher than those 33 patients who had not undergone FESS previously and the mean CT scoring was 31.61

**Table III : Lund MC Kay Scoring of Patients**

	PREVIOUS FESS		TOTAL (N = 40)
	NEGATIVE (N = 33)	POSITIVE (N = 7)	
CT Scoring			
Number	33	7	40
Mean(Sd)	31.61 (12.075)	38.00 (7.141)	32.73 (11.556)
Median	38.00	38.00	38.00
Q1, Q3	20.00, 42.00	38.00, 42.00	20.25, 42.00
Min, Max	15.0, 54.0	23.0, 45.0	15.0, 54.0

Out of all the patients who were included in the study, maximum no of patients had E/hpf in the range of 0-5 followed by 10-15 then 15-20 then 5-10 and 25-30. The eosinophil count was again categorized for patients who had undergone previous FESS and those who had not

undergone FESS previously. It was found that maximum no patients who had not undergone FESS previously had 0-5 eosinophils per high power field. Majority of patients who had undergone FESS previously had 10-15 eosinophils per high power field.

Table IV : Eosinophil Count of Patients

E/HPF, n (%)	PREVIOUS FESS		TOTAL (N = 40)
	NEGATIVE (N = 33)	POSITIVE (N = 7)	
0 - 5	10 (30.3)	01 (14.3)	11 (27.5)
5 - 10	04 (12.1)	0	04 (10.0)
10 - 15	05 (15.2)	04 (57.1)	09 (22.5)
15 - 20	06 (18.2)	0	06 (15.0)
25 - 30	01 (3.0)	02 (28.6)	03 (7.5)
30 - 40	01 (3.0)	0	01 (2.5)
40 - 45	01 (3.0)	0	01 (2.5)
45 - 50	03 (9.1)	0	03 (7.5)
75 - 80	01 (3.0)	0	01 (2.5)
1200 - 1500	01 (3.0)	0	01 (2.5)

In our study when we categorized the patients into two groups then we found that 15 patients had  $\leq 10$  E/HPF and 25 patients had  $>10$  E/HPF with mean CT scoring of  $24.13 \pm 8.991$  and  $37.88 \pm 9.799$  respectively. Independent sample t test was performed and there was moderate degree of correlation between nasal eosinophilia and CT scoring with p value  $< 0.0001$

Table V : Comparison of Eosinophil Count and CT Scoring

EOSINOPHIL COUNT LEVELS	CT SCORE	P VALUE
$\leq 10$ E/HPF	$24.13 \pm 8.991$	$< 0.0001$
$> 10$ E/HPF	$37.88 \pm 9.799$	

## Discussion

Among 40 patients there were male patients than female patients which was consistent with the study done by Bajolia et al<sup>10</sup> where there was male preponderance among all patients.

In our study we found that 15 patients had  $\leq 10$  E/HPF and 25 patients had  $>10$  E/HPF with mean CT scoring of  $24.13 \pm 8.991$  and  $37.88 \pm 9.799$  respectively which is in consistent with study done by Szucs et al<sup>11</sup> in which it was concluded that Eosinophilic mucosal inflammation represents the most severe inflammatory changes of the mucosa. Twenty to forty percent of the patients with chronic rhinosinusitis had no eosinophilic inflammation of the mucosa. The CT-staging system of Lund-Mackay correlated with the extent of mucosal inflammation. maximum no of patients had E/hpf in the range of 0-5.

Our study was also consistent with the study done by Gupta et al<sup>12</sup> which demonstrated a positive correlation between tissue eosinophil counts and Lund-Mackay scores, indicating that higher tissue eosinophil count levels are linked to more severe disease.

In our study it was found that maximum no patients who had not undergone FESS previously had 0-5 eosinophils per high power field. Majority of patients who

had undergone FESS previously had 10-15 eosinophils per high power field. This was in contrast to study done by Wu PW et al<sup>13</sup> in which the average tissue eosinophil count in each HPF was  $27.0 \pm 29.7$  for the total cases,  $49.3 \pm 39.5$  in patients who required revision surgery group, and  $23.1 \pm 25.8$  in patients who did not require revision surgery. The eosinophil infiltration in the sinus mucosa of patients requiring revision surgery was significantly more severe.

However our study was consistent with study by Brescia et al<sup>14</sup> which two patterns of polyposis were recognized depending on the eosinophil count : (1) polyposis rich in eosinophilic component ( $\geq 10$  eosinophils per field); and (2) polyposis poor in eosinophilic component ( $< 10$  eosinophils per field) recurrence rate was significantly higher for patients with eosinophilic-type CRSwNP than for the non-eosinophilic type.

The presence of mucosal eosinophilia (10 eosinophils/HPF) at the time of FESS consistently predicted less improvement in both disease specific and general QOL compared with patients without eosinophilia.<sup>15</sup>

## Conclusion

It was concluded that out of 40 patients 15 patients had  $\leq 10$  E/HPF and 25 patients had  $> 10$  E/HPF with mean CT scoring of  $24.13 \pm 8.991$  and  $37.88 \pm 9.799$  respectively. There was moderate degree of correlation between nasal eosinophilia and CT scoring with p value  $< 0.0001$ .

In our study out of 40 patients 7 had undergone FESS previously and 33 patients were undergoing FESS first time. It was found that 10 patients who had not undergone FESS previously had 0-5 eosinophils per high power field.

6 out of total 40 patients who had undergone FESS previously had more than 10 eosinophils per high power field indicating that tissue eosinophilia is significantly high in recurrent nasal polyps and is an important diagnostic modality to predict the need for further surgeries during counselling of patients.

## References

1. Van Bruaene N, Perez-Novo CA, Basinski TM, Van Zele T, Holtappels G, De Ruyck N et al. T-cell regulation in chronic paranasal sinus disease. *J Allergy Clin Immunol* 2008;121:1435–1441
2. Kountakis SE, Arango P, Bradley D, Wade ZK, Borish L. Molecular and cellular staging for the severity of chronic rhinosinusitis. *Laryngoscope* 2004;114:1895–1905
3. Soler ZM, Sauer D, Mace J, Smith TL. Impact of mucosal eosinophilia and nasal polyposis on quality-of-life outcomes after sinus surgery. *Otolaryngol Head Neck Surg* 2010;142:64–71
4. Nakayama T, Yoshikawa M, Asaka D, Okushi T, Matsuwaki Y, Otori N et al. Mucosal eosinophilia and recurrence of nasal polyps- new classification of chronic rhinosinusitis. *Rhinology* 2011;49: 392–396. 100
5. Matsuwaki Y, Ookushi T, Asaka D, Mori E, Nakajima T, Yoshida T et al. Chronic rhinosinusitis: risk factors for the recurrence of chronic rhinosinusitis based on 5-year follow-up after endoscopic sinus surgery. *Int*
6. Ikeda K, Shiozawa A, Ono N, Kusunoki T, Hirotsu M, Homma H et al. Subclassification of chronic rhinosinusitis with nasal polyp based on eosinophil and neutrophil. *Laryngoscope* 2013;123:E1–E9
7. Tokunaga T, Sakashita M, Haruna T, Asaka D, Takeno S, Ikeda H, Nakayama T, Seki N, Ito S, Murata J, Sakuma Y, Yoshida N, Terada T, Morikura I, Sakaida H, Kondo K, Teraguchi K, Okano M, Otori N, Yoshikawa M, Hirakawa K, Haruna S, Himi T, Ikeda K, Ishitoya J, Iino Y, Kawata R, Kawachi H, Kobayashi M, Yamasoba T, Miwa T, Urashima M, Tamari M, Noguchi E, Ninomiya T, Imoto Y, Morikawa T, Tomita K, Takabayashi T, Fujieda S. Novel scoring system and algorithm for classifying chronic rhinosinusitis: the JESREC Study. *Allergy* 2015; 70: 995–1003
8. Tetsushi Okushi, Tsuguhisa Nakayama, Shigemitsu Morimoto, Chiaki Arai, Kazuhiro Omura, Daiya Asaka, Yoshinori Matsuwaki, Mamoru Yoshikawa, Hiroshi Moriyama, Nobuyoshi Otori. A modified Lund–Mackay system for radiological evaluation of chronic rhinosinusitis. *Auris Nasus Larynx*, Volume 40, Issue 6, 2013, Pages 548-553, ISSN 0385-8146, <https://doi.org/10.1016/j.anl.2013.04.010>. (<https://www.sciencedirect.com/science/article/pii/S038581461300117X>)
9. Snidvongs K, Lam M, Sacks R, Earls P, Kalish L, Philips S, et al. Structured histopathology profiling of chronic rhinosinusitis in routine practice. *Int Forum Allergy Rhinol.* 2012;2:376–85
10. Bajoliya, Sunil & Parmar, Sachin & Patidar, Harshul & Agrawal, Ramesh. (2022). European Journal of Molecular & Clinical Medicine A study to observe the prevalence of nasal polyposis among patients with chronic recurrent rhinosinusitis. 09. 555-559

11. Szucs E, Ravandi S, Goossens A, Beel M, Clement PA. Eosinophilia in the ethmoid mucosa and its relationship to the severity of inflammation in chronic rhinosinusitis. *Am J Rhinol*. 2002 May-Jun;16(3):131-4. Erratum in: *Am J Rhinol* 2002 Sep-Oct;16(5):290. PMID: 12141768
12. Gupta, D. & Mayandi, Parasuraman & Sood, Amit & Kumar, Santosh & Das, Biswajit & Naga, Rahul. (2025). A Study to Compare the Relationship Between Tissue Eosinophilia and Radiological Findings in Nasal Polyposis. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 77. 10.1007/s12070-024-05234-1.
13. Wu PW, Chiu CH, Huang YL, Fan YS, Lee TJ, Huang CC, Chang PH, Huang CC. Tissue eosinophilia and computed tomography features in paediatric chronic rhinosinusitis with nasal polyps requiring revision surgery. *Rhinology*. 2023 Jun 1;61(3):348-357. doi: 10.4193/Rhin22.435. PMID: 37115706
14. Brescia G, Marioni G, Franchella S, Ramacciotti G, Giacomelli L, Marino F, Martini A. A prospective investigation of predictive parameters for post-surgical recurrences in sinonasal polyposis. *Eur Arch Otorhinolaryngol*. 2016 Mar;273(3):655-60. doi: 10.1007/s00405-015-3598-5. Epub 2015 Mar 13. PMID: 25763571.
15. Soler ZM, Sauer D, Mace J, Smith TL. Impact of mucosal eosinophilia and nasal polyposis on quality-of-life outcomes after sinus surgery. *Otolaryngol Head Neck Surg*. 2010 Jan;142(1):64-71. doi: 10.1016/j.otohns.2009.10.005. Epub 2009 Nov 22. PMID: 20096225; PMCID: PMC2811855.



# Unilateral Sinonasal Masses: Insights from a Retrospective Study

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## ABSTRACT

### Introduction

Unilateral sinonasal masses are a common clinical entity in otolaryngology, often presenting with nonspecific symptoms. Although inflammatory lesions predominate, neoplastic conditions may present similarly, necessitating a high degree of clinical vigilance.

### Materials and Methods

A retrospective analysis was conducted on patients presenting with unilateral sinonasal masses at a tertiary care centre between January 2021 and December 2022. Based on histopathological evaluation, cases were stratified into inflammatory and neoplastic groups. Demographic characteristics, clinical presentation, radiological findings, and treatment outcomes were analysed.

### Results

The study included 34 patients (mean age:  $35 \pm 16$  years), with a male predominance (64.7%). Inflammatory lesions accounted for 79.4% of cases, with inflammatory polyps being the most prevalent histological subtype (29.4%). Neoplastic lesions comprised 20.6% of cases, including a single instance (2.9%) of poorly differentiated squamous cell carcinoma. The majority underwent endoscopic surgical management, predominantly functional endoscopic sinus surgery. No recurrences were observed during one year of follow-up.

### Conclusion

Inflammatory polyps represent the most frequent aetiology of unilateral sinonasal masses. Given the diagnostic overlap with neoplastic lesions, comprehensive evaluation incorporating endoscopy, imaging, and histopathology remains imperative for accurate diagnosis and optimal management.

### Keywords

Unilateral Sinonasal Mass; Inflammatory Polyps; Sinonasal Malignancy; Inverted Papilloma

Unilateral nasal obstruction is a frequently encountered complaint in otolaryngological practice, with a broad differential diagnosis ranging from anatomical deviations to space-occupying lesions. Sinonasal masses, defined as abnormal proliferative growths within the nasal cavity or paranasal sinuses, represent approximately 6% of all sinonasal pathologies.<sup>1</sup> Clinical manifestations are often variable,

encompassing mild symptoms such as rhinorrhoea, facial fullness, nasal congestion, and hyposmia, to more overt features including epistaxis, fetid nasal discharge, facial pain or swelling, proptosis, and diplopia.<sup>2</sup>

The underlying aetiology spans a wide spectrum, from inflammatory conditions such as nasal polyps, mucocoeles, retention cysts, fungal rhinosinusitis, and granulomatous diseases, to benign and malignant neoplasms like inverted papilloma, olfactory neuroblastoma, and squamous cell carcinoma. Distinguishing neoplastic lesions from inflammatory or infectious conditions remains a clinical challenge, particularly when initial presentations mimic those of chronic rhinosinusitis.

Key differentiators between benign and malignant lesions include specific symptomatology, lesion

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morphology, anatomical site, extent of local invasion, and radiological characteristics.<sup>3</sup> Nevertheless, definitive diagnosis cannot be reliably established through clinical assessment alone. Therefore, a comprehensive evaluation, comprising diagnostic nasal endoscopy and imaging studies, is indispensable. Crucially, histopathological examination remains the gold standard for diagnosis, guiding both surgical planning and therapeutic strategies.<sup>1,4,5</sup>

This study aims to evaluate the demographic, clinical, radiological, and histopathological characteristics of unilateral sinonasal masses, with particular emphasis on diagnostic challenges and treatment outcomes.

### Materials and Methods

A retrospective descriptive study was conducted at a tertiary care centre, following approval from the Institutional Ethics Committee. Patients diagnosed and treated for unilateral sinonasal masses over a 12-month period were identified from hospital records. Cases with incomplete clinical or diagnostic information were excluded, resulting in a final sample of 34 patients.

Data were collected on demographic profile, presenting complaints, findings from anterior rhinoscopy and diagnostic nasal endoscopy, radiological imaging (CT/MRI), intraoperative details, histopathological diagnosis, and treatment administered. Follow-up telephone interviews were conducted with patients to evaluate their current clinical status and treatment outcomes.

Patients were categorised into three groups based on histopathological diagnosis: non-neoplastic lesions, benign neoplasms, and malignant neoplasms. Statistical analysis was carried out using SPSS software. Fisher's exact test was used to assess the association between gender and histopathological type, while the Mann-Whitney U test was applied to compare age and duration of symptoms between groups. A p-value of <0.05 was considered statistically significant.

### Results

A total of 34 patients with unilateral sinonasal masses were included in the study, comprising 22 males (64.7%) and 12 females (35.3%). The mean age at presentation was  $35.4 \pm 16.2$  years (range: 7–67 years). The majority of cases were within the 31–50-year age group ( $n = 15$ ; 44.2%). The mean duration of symptoms before presentation was 35 weeks (range: 1–156 weeks). Neoplastic lesions presented with a shorter symptom duration (mean = 27 weeks) compared to non-neoplastic lesions (mean = 37 weeks), although the difference was not statistically significant ( $p=0.089$ ).

Histopathological analysis identified non-neoplastic lesions in 27 patients (79.4%), benign neoplasms in 6 (17.7%), and malignant pathology in 1 (2.9%). Although non-neoplastic and malignant lesions were more frequently observed in males, and the mean age at presentation ranged between 35 and 36 years across all histopathological categories, neither gender distribution nor age demonstrated statistical significance. (Table 1)

Nasal obstruction was the most prevalent presenting symptom, reported in 24 patients (70.6%), particularly in cases of non-neoplastic and benign pathology. Epistaxis and a visible nasal mass were reported in 3 patients each (8.8%), while facial swelling and rhinorrhoea were the least frequent symptoms, each reported by 2 patients (5.9%). The sole malignant case presented with a visible mass, and on detailed evaluation, also had nasal obstruction and altered nasal resonance. (Table 1)

All patients underwent diagnostic nasal endoscopy. A solitary pale polypoidal mass was the most common endoscopic finding, seen in 11 patients (32.4%). Computed tomography (CT) of the paranasal sinuses was performed in 24 patients (70.6%), confirming unilateral sinonasal pathology in all. One patient (2.9%) demonstrated bony erosion, while features of allergic fungal rhinosinusitis and rhinolith were observed in two patients (5.9%). Ten patients (29.4%) underwent plain radiography of the paranasal sinuses, although findings were diagnostic in only 5 cases (14.7%): unilateral maxillary sinus opacification in 4 (11.8%) and calcified intranasal opacity in 1 (2.9%).

**Table 1: Distribution of the study population by pathology, gender and symptoms**

	PATHOLOGY			TOTAL	p value
	NON NEOPLASTIC	BENIGN	MALIGNANT		
<b>GENDER</b>					
Male	9	3	0	12 (35.3%)	0.677
Female	18	3	1	22 (64.7%)	
<b>Total</b>	<b>27 (79.4%)</b>	<b>6 (17.7%)</b>	<b>1 (2.9%)</b>	<b>34 (100%)</b>	
<b>SYMPTOMS</b>					
Epistaxis	2	1	0	3 (8.8%)	
Facial Swelling	2	0	0	2 (5.9%)	
Nasal Mass	0	2	1	3 (8.8%)	
Nasal Obstruction	21	3	0	24 (70.6%)	
Rhinorrhoea	2	0	0	2 (5.9%)	
<b>Total</b>	<b>27 (79.4%)</b>	<b>6 (17.7%)</b>	<b>1 (2.9%)</b>	<b>34 (100%)</b>	

Inflammatory nasal polyps constituted the most common histological diagnosis (n = 10; 29.4%), followed by allergic polyps (n = 8; 23.5%). Other non-neoplastic entities included rhinosporidiosis (n = 2; 5.9%) and mucoceles (n = 1; 2.9%). Among benign neoplasms, capillary haemangiomas were most prevalent (n = 3; 8.8%), followed by inverted papillomas (n = 2; 5.9%). A single case of poorly differentiated squamous cell carcinoma was identified (n = 1; 2.9%) (Table 2). There was a good correlation between clinical and histopathological diagnoses (Cohen's  $\kappa = 0.089$ ).

Surgical intervention was performed in 33 patients (97.2%). Functional endoscopic sinus surgery (FESS) was the most common approach (n = 20; 58.8%). Endoscopic excision without sinus surgery was carried out in 7 cases (20.6%), and 6 patients (17.6%) underwent excision with cauterisation. The patient diagnosed with malignancy was referred for chemoradiotherapy. All surgically managed patients had an uneventful postoperative course, with no recurrence or residual disease noted during the 12-month follow-up period.

**Table II: Histopathological distribution of Unilateral sinoasal mass**

HISTOPATHOLOGIC DISEASE	n = 34
Non-Neoplastic	
Inflammatory Polyp	10 (29.4%)
Allergic Polyp	8 (23.5%)
Rhinolith	3 (8.8%)
Rhinosporidiosis	2 (5.9%)
Extravasation Mucocele	1 (2.9%)
Pyogenic Granuloma	1 (2.9%)
Benign neoplastic	
Capillary Haemangioma	3 (8.8%)
Inverted Papilloma	2 (5.9%)
Haemangioma	1 (2.9%)
Malignant	
Poorly differentiated squamous cell carcinoma	1 (2.9%)

## Discussion

Unilateral sinonasal mass lesions continue to pose a diagnostic dilemma due to their heterogeneous etiologies and account for approximately 6% of all sinonasal pathologies.<sup>4</sup> Establishing an accurate diagnosis necessitates a meticulous clinical history, comprehensive physical examination, diagnostic nasal endoscopy, and radiological imaging. However, histopathological evaluation remains the definitive method for establishing the nature of these lesions.<sup>5</sup>

Chronic rhinosinusitis remains the most frequently encountered pathology associated with sinonasal masses. This condition may arise secondary to bacterial, fungal, or parasitic infections, or it may represent a manifestation of IgE-mediated or non-IgE-mediated hypersensitivity, ultimately leading to the formation of nasal polyps.<sup>6</sup> Less common etiologies include HPV-related papillomas, premalignant entities such as Schneiderian papillomas, lesions arising from vascular structures, congenital anomalies like meningocele or meningoencephalocele extending into the nasal cavity, and malignant tumours including carcinomas, sarcomas, or, more rarely, metastatic disease.<sup>7</sup>

In the present analysis, the mean age at presentation was 35.4 years, closely aligning with the findings reported by Bakari A et al.<sup>7</sup> Nasal obstruction was the predominant presenting symptom, corroborating the findings of previous investigations by Humayun et al., Dasgupta et al., and Pradhananga et al.<sup>8,9,10</sup>

Nasal polyps represented the most frequently identified pathology in this study, consistent with observations reported by Belli et al. and Lee JY et al.<sup>11,12</sup> Overall, non-neoplastic lesions constituted the majority of unilateral sinonasal masses, in concordance with the findings of Kahveci et al.<sup>13</sup> This contrasts with the study by Shuaibu et al., who reported a higher incidence of neoplastic lesions, likely attributable to the relatively older age group evaluated in their series.<sup>14</sup> These findings reinforce the imperative of maintaining a high index of clinical suspicion for malignancy, particularly in older individuals presenting with unilateral nasal masses.<sup>14</sup>

Among the non-neoplastic entities, inflammatory

polyps were the most prevalent, a trend similarly reported by Kucur et al.<sup>15</sup> Inverted papilloma emerged as the most common benign neoplasm in our series (5.9%), a finding comparable to that of Shuaibu et al.<sup>14</sup> Despite its benign histological classification, inverted papilloma is recognized for its aggressive local behavior, notable recurrence rates, and potential for malignant transformation.<sup>16</sup> Importantly, no recurrence or evidence of malignant change was observed in any of our patients during the follow-up period.

Squamous cell carcinoma was the only malignancy detected, accounting for 2.9% of cases. This observation is in agreement with findings from Nair et al., who also identified squamous cell carcinoma as the most prevalent unilateral sinonasal malignancy, followed by adenocarcinoma and non-Hodgkin lymphoma.<sup>17</sup>

## Conclusion

Unilateral sinonasal masses, often presenting in the fourth decade, remain diagnostically challenging due to nonspecific clinical features. While inflammatory polyps are most common, the possibility of neoplastic lesions must not be overlooked. A combined approach involving imaging and histopathological confirmation is essential for accurate diagnosis and appropriate management.

## References

1. Kim WA. Tumors of the nose and sinuses. In: Hussain SM, editor. Logan Turner's Diseases of the Nose, Throat and Ear Head and Neck Surgery. 11th ed. New York: CRC Press; 2016. p. 119-29
2. Tritt S, McMains KC, Kountakis SE. Unilateral nasal polyposis: clinical presentation and pathology. *American journal of otolaryngology*. 2008 Jul 1;29(4):230-2
3. Hakami K, Basurrah M, Alshehri AM, Althagafi KA, Alotaibi AO, Alharthi MF. Clinical, histopathological, and radiological features of unilateral nasal mass in Saudi Arabia: A retrospective study. *Saudi Journal for Health Sciences*. 2020 Jan 1;9(1):45-9
4. Paz Silva M, Pinto JM, Corey JP, Mhoon EE, Baroody FM, Naclerio RM. Diagnostic algorithm for unilateral sinus disease: a 15 year retrospective review. *International forum of allergy & rhinology* 2015 Jul (Vol. 5, No. 7, pp. 590-596)
5. Ahsan F, El-Hakim H, Ah-See KW. Unilateral opacification of paranasal sinus CT scans. *Otolaryngology—Head and Neck Surgery*. 2005 Aug;133(2):178-80
6. Lathi A, Syed MM, Kalakoti P, Qutub D, Kishve SP. Clinico-

- pathological profile of sinonasal masses: a study from a tertiary care hospital of India. *ACTA otorhinolaryngologica italica*. 2011 Dec;31(6):372
7. Bakari A, Afolabi OA, Adoga AA, Kodyia AM, Ahmad BM. Clinico-pathological profile of sinonasal masses: an experience in national ear care center Kaduna, Nigeria. *BMC Research Notes*. 2010 Dec;3:1-5
  8. Humayun AH, Huq AZ, Ahmed ST, Kamal MS, Bhattacharjee N. Clinicopathological study of sinonasal masses. *Bangladesh Journal of Otorhinolaryngology*. 2010;16(1):15-22
  9. Dasgupta A, Ghosh RN, Mukherjee C. Nasal polyps—histopathologic spectrum. *Indian Journal of Otolaryngology and Head and Neck Surgery*. 1997 Jan;49:32-7
  10. Pradhananga RB, Adhikari P, Thapa NM, Shrestha A, Pradhan B. Overview of nasal masses. *Journal of Institute of Medicine Nepal*. 2008;30(3):13-6
  11. Belli S, Yildirim M, Eroglu S, Emre FK. Single-sided sinonasal mass: A retrospective study. *Northern Clinics of İstanbul*. 2018 Apr 12;5(2):139-43
  12. Yong Lee J. Unilateral paranasal sinus diseases: analysis of the clinical characteristics, diagnosis, pathology, and computed tomography findings. *Acta oto-laryngologica*. 2008 Jan 1;128(6):621-6
  13. Kahveci OK, Duran A, Miman MC. Our histopathological results for intranasal masses; retrospective study of 6 years burun. *JOURNAL OF CLINICAL AND ANALYTICAL MEDICINE*. 2012 Jul 1;3(3):289-92
  14. Shuaibu IY, Usman MA, Ajiya A. Unilateral sinonasal masses: Review of clinical presentation and outcome in Ahmadu Bello university teaching hospital, Zaria, Nigeria. *Nigerian Medical Journal*. 2020 Jan 1;61(1):16-21
  15. Kucur C, Ođhan F, Özbay Ý, Erdođan O, Tok S, Panal B, Korkmaz M, Yildirim N. Unilateral nasal pathologies: clinical presentation and management. *ENT UPDATES*. 2015;5(1)
  16. Nygren A, Kiss K, von Buchwald C, Bilde A. Rate of recurrence and malignant transformation in 88 cases with inverted papilloma between 1998–2008. *Acta Oto-Laryngologica*. 2016 Mar 3;136(3):333-6\
  17. Nair S, James E, Awasthi S, Nambiar S, Goyal S. A review of the clinicopathological and radiological features of unilateral nasal mass. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2013 Aug;65:199-204.

# A Follow-up Study on One Minute Paper as Feedback for Lecture Classes in Medical Education

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## ABSTRACT

### Introduction

To make the best use of the feedback, it is very important that the teacher analyses each and every feedback and make necessary changes in their teaching method and style. The “one-minute paper” or OMP is a very short, in-class writing activity, taking one minute or less to complete. The aim of our study is to assess the benefit of changing our teaching styles based on a previous OMP feedback.

### Materials and Methods

This study was carried out simultaneously in two different departments (ENT and General Surgery) in our hospital. The first feedback was taken and analysed. Based on the analysis, modifications were made in the teaching-learning process. The second feedback was taken one year later on the same topics but on a different (subsequent) batch. In each subject, the first and second feedbacks were compared and analysed.

### Results

We found that there was a significant drop in queries after introducing more videos, teaching by case based approach and focussing more on topics which students found difficult to understand.

### Conclusion

OMP is a very quick, simple and efficient method of obtaining student feedback in a large group. Analysing the responses helps in modifying subsequent lectures in a more student friendly way.

### Keywords

One Minute Paper Feedback; Follow-up; Large Group Teaching

Teachers can gain valuable insights into their teaching practices and can identify areas for growth and improvement by soliciting feedback from students. Student feedback highlights areas where teachers can excel in their teaching, such as engaging presentation styles, clearing explanations, or using technology effectively. Feedbacks, especially anonymous, can also tell the drawbacks in the teaching method and style. If students consistently express difficulty in understanding a particular concept, the teacher can revise their teaching approach or provide additional resources. To make the best use of the feedback, it is very important that the teacher analyses each and every feedback and make necessary changes in their teaching method and style.

The “one-minute paper” or OMP is a very short, in-class writing activity, taking one minute or less to complete.

At the end of the session, the student is asked to answer few questions, which prompts students to reflect on the day’s lesson, and provides the instructor with useful feedback. Weaver and Cottrell<sup>1</sup> first developed the one-minute paper. It was popularized by Cross and Angelo in

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late eighties.<sup>2</sup> Quite a few articles<sup>3,4,5,6,7</sup> have been written about this method of feedback and its benefits but there is paucity in literature about follow up studies on this method. We did this study to assess the benefit of changing our teaching styles based on a previous OMP feedback.

## Materials and Methods

This quasi – experimental study was carried out simultaneously in two different departments (ENT and General Surgery) in our hospital. Ethical clearance was taken from the Institutional Ethics committee. The topic for ENT was “Epistaxis and it’s management” And for General Surgery it was “Burns”. In ENT, the first feedback was taken in the year 2022 on a batch of 82 students. In General Surgery, the first feedback was taken in the year 2022 on a batch of 78 students. It was a one hour lecture. The contents were aligned with the specific learning objectives decided for that topic. To avoid instructor variability, the same faculty took classes in both the years.

At the end of the session, the one-minute feedback paper was provided to the students as a sheet of paper with three questions printed on it. The students were told to write their answers in words, phrases and short sentences. The feedback taken was anonymous. The students were told not to write their name on the feedback papers. They were explained about this study and were given the option of not participating in the study if they so desired. Filling up the feedback form was considered as

consent for participation. Three questions were asked: (1) What are the five most important things you learnt today? (2) What are the things you did not understand? and (3) What are your suggestions for changes in teaching-learning method? The first question focused on what was being learned, second question was related to any difficulty in understanding of the lecture and the third question focused on the kind of changes the students wanted. The responses were analysed and necessary changes were made in the content of the lecture to overcome the shortcomings detected.

The second feedback was taken one year later on the same topics but on a different (subsequent) batch. In ENT, it was in the year 2023 on a batch of 79 students. In General Surgery, it was in the year 2023 on a batch of 73 students. The topic was the same but the teaching methods and contents were modified based on the previous OMP feedback. At the end of the lecture, feedbacks were again taken according to the OMP method. In each subject the first and second feedbacks were compared and analysed.

## Results

In the ENT department it is found that the answers to question number 1 show a small degree of difference among the responses (Table I). Maximum number of responses are centred on anatomy of nasal cavity with importance of piriform aperture, aetiology and management of epistaxis.

The answers to question number 2 for both the groups are

**Table 1: Responses for the learning aspect**  
**What are the five most important things you learnt today?**

SL NO	RESPONSE	2022 (n = 82)	2023 (n = 79)
1	Anatomy of nasal cavity and septum in relation to epistaxis, Little’s area and Woodruff’s area and their importance	70 % (57)	62% (49)
2	Aetiology of Epistaxis, severity assessment	52 % (43)	41% (32)
3	Pyriform aperture to classify anterior and posterior epistaxis	42 % (34)	25% (20)
4	Probe test to asceses nasal mass	42% (34)	30% (24)
5	Diagnostic nasal endoscopy	5% (4)	2% (2)
6	Anterior and posterior rhinoscopy	11% (9)	13% (10)
7	Management by nasal packing especially posterior packing	78% (64)	97% (77)
8	Juvenile nasopharyngeal angiofibroma	28% (23)	20% (16)

summarized in Table II. It shows that the doubts are significantly less in students of 2023 batch compared to 2022 batch for all the responses.

**Table II: Responses for the questions which remained unclear at the end of lecture**  
**What are the things you did not understand ?**

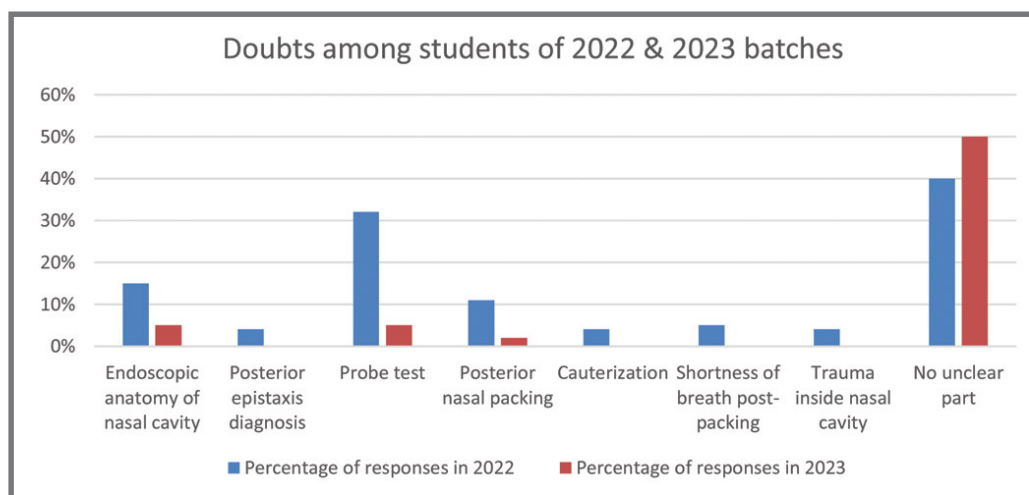
SL NO	RESPONSE	2022 (n=82)	2023 (n=79)
1	Endoscopic anatomy of nasal cavity	24% (20)	5% (4)
2	Posterior epistaxis Diagnosis	4% (3)	0% (0)
3	Probe test	32% (26)	5% (4)
4	Posterior nasal Packing	18% (15)	2% (2)
5	Cauterization	4% (3)	0% (0)
6	Shortness of breath following Nasal packing	5% (4)	0% (0)
7	Trauma inside nasal cavity during nasal packing	4% (3)	0% (0)
8	No unclear part	40% (33)	50% (40)

It is found that doubts for endoscopic nasal anatomy ( p value=0.0052 i.e.,  $p < 0.05$ ), probe test ( p value=0.00035 i.e.,  $p < 0.05$ ) and posterior nasal packing ( p value=0.0093 i.e.,  $p < 0.05$ ) are reduced in significant way over the year due to modification of teaching-learning method based on feedbacks obtained through OMP in previous year. Figure-1 shows the improvements (%) of doubts for each response of table-2 among students of 2023 batch than student of 2022 batch.

The answers to question number 3 for both the groups are summarized in Table 3. Students are satisfied with inclusion of more case base discussions and more number of small videos. It helps to clear their concepts.

**Table III: Responses for the call for suggestions for improvement**  
**What are your suggestions for change?**

SL NO	RESPONSE	2022 (N=82)	2023 (N=79)
1	Demonstration on patients or model	8% (7)	15% (12)
2	More videos inclusion	19% (16)	0% (0)
3	More case discussion	2% (2)	0% (0)
4	Instrument demonstration	8% (7)	0% (0)
5	No suggestions	70% (57)	83% (66)



**Fig. 1. Comparison of doubts in ENT class among the students of 2022 & 2023 batches**

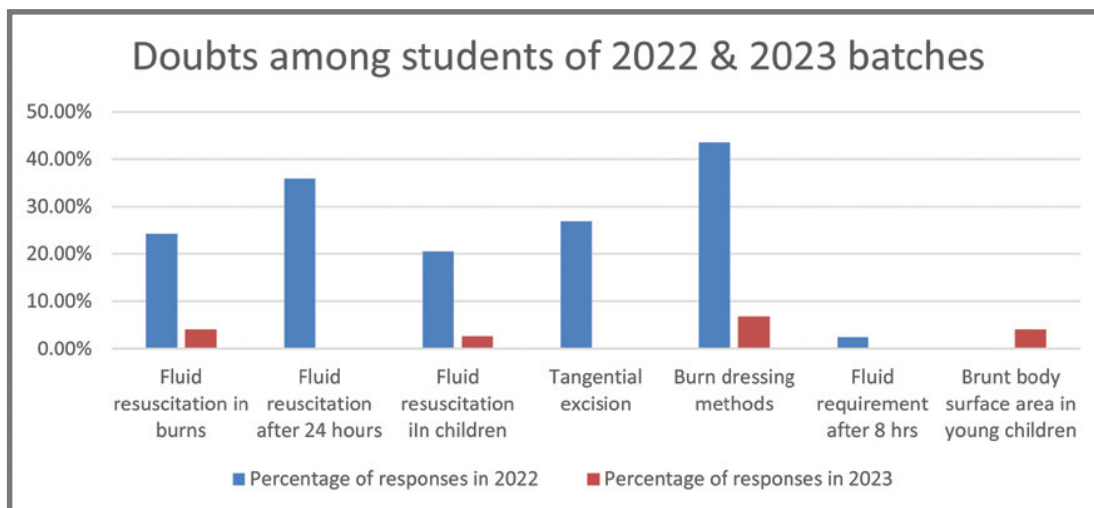
In the General Surgery department it was found that the answer to question number 1 was almost similar in both the groups (Table IV). The answers to question number 2 for both the groups are summarized in Table V. The answers to question number 3 for both the groups are summarized in Table VI.

**Table IV: Responses for the learning aspect**  
What are the five most important things you learnt today?

SL NO.	RESPONSE	2022 (n=78)	2023 (n=73)
1.	Types of burns	78 (100%)	73 (100%)
2.	Classification of burns	78 (100%)	73 (100%)
3.	Calculation of burnt body surface area in burn patients	72(92.3%)	64 (87.6%)
4.	Fluid resuscitation in burns	75(96.1%)	73 (100%)
5.	Burn dressing	6 (7.6%)	3 (4.1%)
6.	Management of burns	72 (92.3%)	71 (97.2%)
7.	Tangential excision of burns	9 (11.5%)	7 (9.5%)

**Table V: Responses for the questions which remained unclear at the end of lecture**  
What are the things you did not understand?

SL NO.	RESPONSE	2022 (n=78)	2023 (n=73)
1.	Fluid resuscitation in burns	19 (24.3%)	3 (4.1%)
2.	Fluid resuscitation after 24 hours	28 (35.8%)	0 (0%)
3.	Fluid resuscitation in children	16 (20.5%)	2 (2.7%)
4.	Tangential excision of burns	21 (26.9%)	0 (0%)
5.	Methods of burn dressing	34 (43.5%)	5 (6.8%)
6.	How to calculate the fluid requirement if the patient presents after 8 hours?	2 (2.5%)	0 (0%)
7.	How to calculate the burnt body surface area in young children?	0 (0%)	3 (4.1%)



**Fig. 2. Comparison of doubts in General Surgery class among the students of 2022 & 2023 batches**

It is detected that doubts for fluid resuscitation in burns (p value=0.000989, i.e.,  $p < 0.05$ ), fluid resuscitation after 24 hours (p value=0.00000047, i.e.,  $p < 0.05$ ), fluid resuscitation in children (p value=0.001828, i.e.,  $p < 0.05$ ), tangential excision of burns (p value = 0.00000556, i.e.,  $p < 0.05$ ) and methods of burn dressing (0.000000674, i.e.,  $p < 0.05$ ) are reduced in significant way over the year due to modification of teaching-learning method based on feedbacks obtained through OMP in previous year. Figure-2 shows the improvements (%) of doubts for each response of table-5 among students of 2023 batch than student of 2022 batch.

**Table VI : Responses for the call for suggestions for improvement**  
What are your suggestions for change?

SL NO.	RESPONSE	2022 (n=78)	2023 (n=73)
1.	The lecture was too fast	23 (29.4%)	6 (8.2%)
2.	Use more videos	43 (55.1%)	2 (2.7%)
3.	The teaching should be more case based	38 (48.7%)	0 (0%)
4.	Medicolegal aspects of burn injuries should be discussed	14 (17.9%)	17 (21.7%)
5.	The class should be more interactive	22 (28.2%)	0 (0%)
6.	Difficulty to pay attention in a post lunch lecture class. Lecture classes should be in the morning.	42 (53.8%)	34 (43.5%)
7.	A case should be taught in bedside clinics	0 (0%)	3 (4.1%)

We found that there was a significant drop in queries after introducing more videos, teaching by case based approach and focussing more on topics which students

found difficult to understand. Certain aspects like changing the timing of the lecture classes and teaching the medicolegal aspects (taught later in forensic class) were beyond our scope.

Observations in Table/ 1: Topic on management by posterior nasal packing showed a large positive effect size: +19.4% (78% to 97.5%).

Other topics showed small negative effect sizes (e.g., Pyriform aperture: -16.1%).

Confidence Intervals (CI) are naturally narrower on very high or low proportions (near 0% or 100%). E.g., Responses on management by nasal packing in 2023 had a CI of 94.0–100%, showing high precision.

These tables directly show effect sizes as absolute risk differences (percentage point reduction in doubts) and relative risks (RR) or odds ratios (from regression).

Observations: The absolute reductions were large and practically meaningful: e.g., Probe test doubts dropped by 27% (from 32% to 5%) as well as methods of burn dressing dropped by 37%. Relative risk (RR) values  $< 0.2$  show that the odds of doubt were ~80–90% lower in the 2023 batches.

Confidence Intervals (CI): CIs around 2022 batch estimates were generally wider (e.g., 21.6–41.8%) than those around the smaller 2023 estimates (e.g., 0.2–9.9%). Narrower CIs for the 2023 group reflect lower variance (fewer students reporting doubt). CIs not overlapping between groups support statistical significance, aligning with the p-values.

Tables 3 (suggestions for improvement):

Observations in Table/ 3: ‘Suggestions’ dropped sharply with more video inclusion (-19.5%).

Surgery Table/ 6: ‘Suggestions’ dropped even more (-52.4%). Responses on ‘No suggestions’ increased in ENT (+14.0%), suggesting higher satisfaction.

Confidence intervals (CI): CIs are wider for smaller proportions; e.g., 2.5–14.6% in 2022 for small suggestions. Where suggestions dropped to 0%, CI becomes 0.0–0.0%, reflecting no variance.

Table VII: Calculation of Effect size &amp; Confidence Intervals

RESPONSE	DOUBTS ON TOPIC-EPISTAXIS & ITS MANAGEMENT				DOUBTS ON TOPIC-BURNS				
	ENDO-SCOPIC ANATOMY OF NASAL CAVITY	POSTERIOR EPISTAXIS DIAGNOSIS	PROBE TEST	POSTERIOR NASAL PACKING	FLUID RESUSCITATION IN BURNS	FLUID RESUSCITATION AFTER 24 HOURS	FLUID RESUSCITATION IN CHILDREN	TANGENTIAL EXCISION OF BURNS	METHODS OF BURN DRESSING
95% CI for 2022 batch	15.1–33.7%	0-7.7%	21.6-41.8%	9.9-26.7%	14.8-33.9%	25.3-46.5%	11.6-29.5%	17.1-36.8%	32.6-54.6%
95% CI for 2023 batch	0.2–9.9%	0-0%	0.2-9.9%	0-6.0%	00-8.7%	0-0%	0-6.5%	0-0%	1.1-12.6%
Absolute Risk Difference	-19%	-4%	-27%	-16%	-20%	-36%	-18%	-27%	-37%
Relative Risk	0.21	0	0.16	0.14	0.17	0	0.13	0	0.16

## Discussion

Gathering feedback is a very important step towards the process of improvement. Feedback analysis tells us about the necessary modification required for subsequent lectures. The great advantage of One Minute Paper is that it provides a reasonable amount of timely and useful feedback with minimal effort.

According to Stead D. R; One Minute Paper provides instant feedback on class's understanding. It's an easy, resilient and widely used technique without any need of technology. Student can cogitate on what they have heard and ask questions on the topic learnt while providing the feedback.<sup>8</sup> For the teacher, the OMP answers help to ascertain the extent to which the aims and objectives of the class have been achieved, as well as help to set the future pace of teaching.<sup>8</sup>

In our study it was seen that analysing the feedback and making suitable changes helped to make the lectures more effective. It is noted that One Minute Paper helps

to enhance class attention and better communication. OMP also serves as a tool for active learning.<sup>9</sup> In literature there are many studies on ways of giving feedback to students but there are very few articles regarding methods of taking feedback from the students. Most of the available literature is on the pre and post test model.<sup>10</sup> This method emphasizes more on the fixed topics. Our method of OMP and its subsequent follow up brings out unforeseen doubts among the students, hence it is more effective.

The responses obtained in OMP can be evaluated and analysed in little time and with minimal effort even for a large group.<sup>2</sup> These findings are consistent with our study. Most of the time students' learning is not up to the mark due to lack of uniform undergraduate ENT teaching curriculum across different medical colleges. Total hours allotted to ENT teaching are also limited resulting in inadequate in-depth learning. OMP acts as a consistent feedback measure that may help to standardize ENT teaching across institutions.<sup>11</sup> Knowledge acquisition and

its further application become effective when the students acquire clear concepts on the complex anatomy of ear, nose and throat.

It is obvious that understanding of complex endoscopic anatomy becomes clearer after inclusion of small video clips. It not only builds their concepts for further knowledge, but also helps them learn clinical part related to the topic along with better understanding of various diagnostic and therapeutic procedures. According to Caputo V et al. videos help students to retain complex 3D anatomy.<sup>12</sup>

In our study, the suggestion of adding small videos on clinical methods and procedures helped us later in preparing lectures with video demonstrations which was very much appreciated by the students. Barbara Robertson and Mark J. Flowers found that understanding and retention of a topic is better if lecture class is taken in combination of lecture video with power point presentation as teaching aid,<sup>13</sup>

As there is paucity in literature of articles discussing about the effect of the changes made by analysing feedback, it is difficult to compare our study with other studies.

One Minute Paper can help ENT teaching as well as procedural skill development of students/ residents by encouraging regular feedback between students/ residents and faculty with goal oriented learning and promoting their active participation. It helps them to identify areas of deficiency and pursue progress over time.

We find that the suggestions given in the feedback are not always feasible. Certain things cannot be changed. Nevertheless, feasible suggestions can make huge changes. In this study we found that elaborating the difficult topics and introducing new methods, has a huge impact on student learning. We observed another important thing that anonymous feedback has a better compliance. Students were not vocal when asked in the classroom but shared their true doubts in the anonymous feedback forms. The students were fully aware that there was no way to identify the source of feedback. This enabled them to give a genuine feedback without any social desirability bias. For example, a feedback that the

teacher was too fast or that it was too difficult to concentrate in a post lunch session could not be given if the feedback was not anonymous. According to Shaheen A. et al. anonymous feedbacks establish more active participation from students' end as well as reduce their uneasiness about writing down the true responses<sup>14</sup>. OMP feedback technique respects all the responses provided by the students and encourages students to be engaged actively.<sup>10</sup>

OMP can be used to assess students' / residents' understanding of complex endoscopic anatomy. It also helps to evaluate their procedural skills like performing endoscopic procedures or other technical skills in operating room<sup>15</sup>. These ultimately help to provide better patient care service in terms of diagnosis, management of ENT cases by developing skilled ENT specialists in a well-planned and fruitful learning environment. This is also applicable to other speciality too.

## Conclusion

OMP is a very quick, simple and efficient method of obtaining student feedback in a large group. Analysing the responses aids in modifying subsequent lectures in a more student friendly way. These modified lectures help the students to understand the topic with more clarity, resulting in better retention of what they are taught. The study concludes that one minute paper is a useful method of gathering feedback for refining teaching-learning methods in medical education encouraging students in active learning. More multi - institutional and multi-topic studies are required to establish generalizability. Further longitudinal feedback tracking is required over the coming years to establish the fact strongly.

## References

1. Weaver RL, Cortell HW. Mental aerobics: The half-sheet response. *Innovative Higher Education*. 1985; 10:23-31
2. Angelo TA, Cross KP. *Classroom Assessment Techniques*. 2nd ed. San Francisco: Jossey-Bass; 1993
3. Ashakiran S, Deepthi R. One-Minute Paper: A thinking centered assessment tool. *Internet J Med*. 2013;8(2):1-9. 5

4. Singh MK, Lawrence R, Headrick L. Expanding educators' medical curriculum tool chest: minute papers as an underutilized option for obtaining immediate feedback. *J Grad Med Educ.* 2011 June;3(2):239-42
5. Sahoo BK, Taywade M. One minute paper: The reflective way to teach and learn in medical education. *Indian Journal of Forensic and Community Medicine.* 2021;8(1):58-62
6. Mukhopadhyay M, Paul S, Das S. The one-minute paper: A quick feedback from an one-hour class. *J Med Allied Sci.* 2024; 14(2): 51-54
7. Chizmar JF, Ostrosky AL. The one-minute paper: some empirical findings. *J Econ Educ.* 1998;29(1):3-10
8. Stead D. R. . A review of the one-minute paper. *Active Learning in Higher Education* 2005; 6(2), 118-131. <https://doi.org/10.1177/1469787405054237>
9. William S. Harwood. The One-Minute Paper: A Communication Tool for Large Lecture Classes. *Journal of Chemical Education* 1996; 73 (3), 229. DOI: 10.1021/ed073p229
10. Dabade SK, Dabade KJ. Effectiveness of pre- and post-test model of learning among MBBS students - An evaluative study. *Natl J Physiol Pharm Pharmacol* 2019;9(1):58-61
11. Mughal Z, Gupta KK, Fruhstorfer B. Otolaryngology Education in Medical Training: A Literature Review of Current Practice, Challenges, and Future Directions. *Annals of Otolaryngology, Rhinology & Laryngology.* 2025;0(0). doi:10.1177/00034894251343373
12. Caputo, V., Denoyelle, F. & Simon, F. Educational endoscopic videos improve teaching of middle ear anatomy. *Eur Arch Otorhinolaryngol* 281, 4649-4655 (2024). <https://doi.org/10.1007/s00405-024-08658-1>
13. Robertson. B. & Flowers. M.J. Determining the impact of lecture videos on student outcomes. *Learning and teaching*, 2020; 13 (2), 25-40. DOI: <https://doi.org/10.3167/latiss.2020.130203>
14. Shaheen A, Azam F, Irshad K. Anonymous Feedback: A Real-time Feedback to Capture Students' Engagement in Learning Process. *Advances in Social Science, Education and Humanities Research* 2021;567:65-68. DOI:10.2991/assehr.k.210930.011
15. Beckhorn CB, Goins SM, Rosen MR, Soto AL, Thornton SW, Howell TC, Kang L, Fathalizadeh A, Tracy ET, Vatsaas CJ. Impact of a Surgical Skills Curriculum on Medical Student Procedural Experience and Confidence. *J Surg Res.* 2025 Jun;310:226-238. doi: 10.1016/j.jss.2025.03.033. Epub 2025 Apr 29. PMID: 40306204.

# Clotrimazole Cream versus Ear Drops for Otomycosis: A Randomized Trial

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## ABSTRACT

### Introduction

Otomycosis is a superficial fungal infection of the external auditory canal with a global prevalence ranging from 9% to 30%. The increased use of antibiotic ear drops has contributed to its rising incidence. This study aimed to compare the effectiveness of clotrimazole cream and clotrimazole ear drops in managing otomycosis.

### Materials and Methods

A prospective, randomized controlled trial was conducted on 300 patients diagnosed with otomycosis. Patients were divided into two groups: Group A received clotrimazole cream administered by ENT specialists, and Group B used clotrimazole ear drops as self-medication. All participants were followed for four weeks, with clinical evaluations performed weekly.

### Results

After one week, Group A (clotrimazole cream) achieved a 98% resolution rate, while Group B (clotrimazole drops) achieved an 86% resolution rate. The cream group showed fewer treatment failures and recurrences compared to the drop group ( $p < 0.001$ ).

### Conclusion

Clotrimazole cream is more effective than ear drops in treating uncomplicated otomycosis. Its occlusive application and higher compliance may contribute to superior clinical outcomes.

### Keywords

Otomycosis; Clotrimazole; Topical Anti-Fungals; Cream versus Ear Drops

Otomycosis is a common superficial fungal disease that affects the External Auditory Canal (EAC).<sup>1</sup> The disease may show as acute, sub acute, or chronic, and is regularly one-sided, with the respective frame being more common in immunocompromised patients.<sup>2</sup> The disease is shown all-inclusive, with predominance extending from 9% to 30% in patients with the signs and indications of EAC disease.<sup>3</sup>

Otomycosis is ordinarily caused by inclining components, such as the passage of foreign bodies into the ear canal, traumatic insemination of wood particles, plant materials and soil into the ear canal, scratching and control of the ear canal with non-sterile hardware, living in dusty zones or damp climate, stickiness of the ear canal after swimming and showering, and fungal nail contamination and dermatophytic injuries around the ear.<sup>4,5</sup> It is a global disease but is more common in adults than in kids and females than in males.<sup>6</sup> Fungi are ordinarily found within the external ear as colonizers since

this surface contains the vital necessities for their development: proteins, carbohydrates, humidity, temperature and adequate Ph.<sup>7</sup>

Otomycosis is related to numerous complications including inclusion of the internal ear with mortality in uncommon cases. Formation of a fungus ball or fungal mass of mycelia, epithelial cells, and wax within the ear canal: exposure of this mass to the tympanic membrane are cause of hearing loss and sometimes perforation.<sup>8</sup> The mycosis can have a destitute prognosis in immunocompromised people, particularly in cases of cellular immunodeficiency and neutropenia.<sup>9</sup> The infection presents numerous challenges, both for patients and for

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ENT specialists, and may recur despite long-term treatment and follow-up.<sup>10</sup> *Aspergillus* and *Candida* genera are the major etiologic agent for otomycosis. Beside this, third group which caused otomycosis included *Dermatophytes* (*Trichophyton mentagrophytes*). In rare cases, other saprophytic fungi have been isolated from otitis discharge including *Fusarium* spp., *Penicillium* spp. *Mucor* spp. and *Geotrichum* spp.<sup>11,12</sup>

These days otomycosis treatment has made challenges both for patients and specialists in show disdain toward of the need for the long process of treatment and the credibility of relapse. Treatment recommendations incorporate reliable debridement of fungal agents from the ear canal, combined with the application of local and systemic anti-fungal.<sup>13,14</sup> The primary line of treatment depends on the type of fungus isolated and incorporates commonly used, anti-fungal agents. More recently, azoles in the form of topical ketoconazole, miconazole and clotrimazole have become the pillar of treatment choices for otomycosis. Topical clotrimazole cream has been to a great extent utilized to treat otomycosis with variable success rates. Among topical anti fungals, topical clotrimazole cream and clotrimazole ear drops show up to be a great treatment option.<sup>15,16</sup>

Accordingly, this research was done to compare improvement rate of otomycosis treated with topical medications; clotrimazole cream and clotrimazole ear drops. Relative frequency of response to treatment in both groups was assessed amid three periods. Finally, it was tested whether relative recurrence contains a noteworthy difference regarding reaction to treatment when comparing clotrimazole cream with clotrimazole ear drops based on clinical perceptions regarding the adequacy of each agent. The objective of this study was to compare the effectiveness of clotrimazole cream and clotrimazole ear drops in managing otomycosis.

## Materials and Methods

This research is a clinical trial conducted on 300 patients who were diagnosed with otomycosis.

A controlled, randomized, open clinical trial was conducted within the otorhinolaryngology and head and

neck surgery department of Hind Institute of Medical Sciences, Sitapur, in western UP from September 2024 to February 2025. Patients diagnosed with clinical otomycosis (visualization consistent with fungal debris was done through microscopic examination) were allocated to one of two treatment groups according to a computer-generated randomization table. Statistic and clinical data were collected, and two samples of affected EAC were taken from each patient with the help of an ear pick and/or suction cleaner and then placed in a sterile transport medium for direct microscopic examination and culturing to distinguish the pathogenic organisms involved. For the direct examination, the material was mixed with saline solution on a slide, secured with a cover slip and visualized beneath the optical microscope at 10X and 40X magnifications. For the culture, the sample was embedded in a Saboraud dextrose agar medium incubated at 27-30! for a least 7 days. All patients underwent EAC cleaning and debridement. Clotrimazole cream was applied to the patients in Group A with a sterile, fresh 5 ml syringe and was left for 7 days; after that time, the cream residue was removed from the EAC, and the otic conditions were re-evaluated. Patients in Group B were instructed to apply Clotrimazole solution, 4 drops every 6 h for 7 days, after which time the otic conditions were re-evaluated.

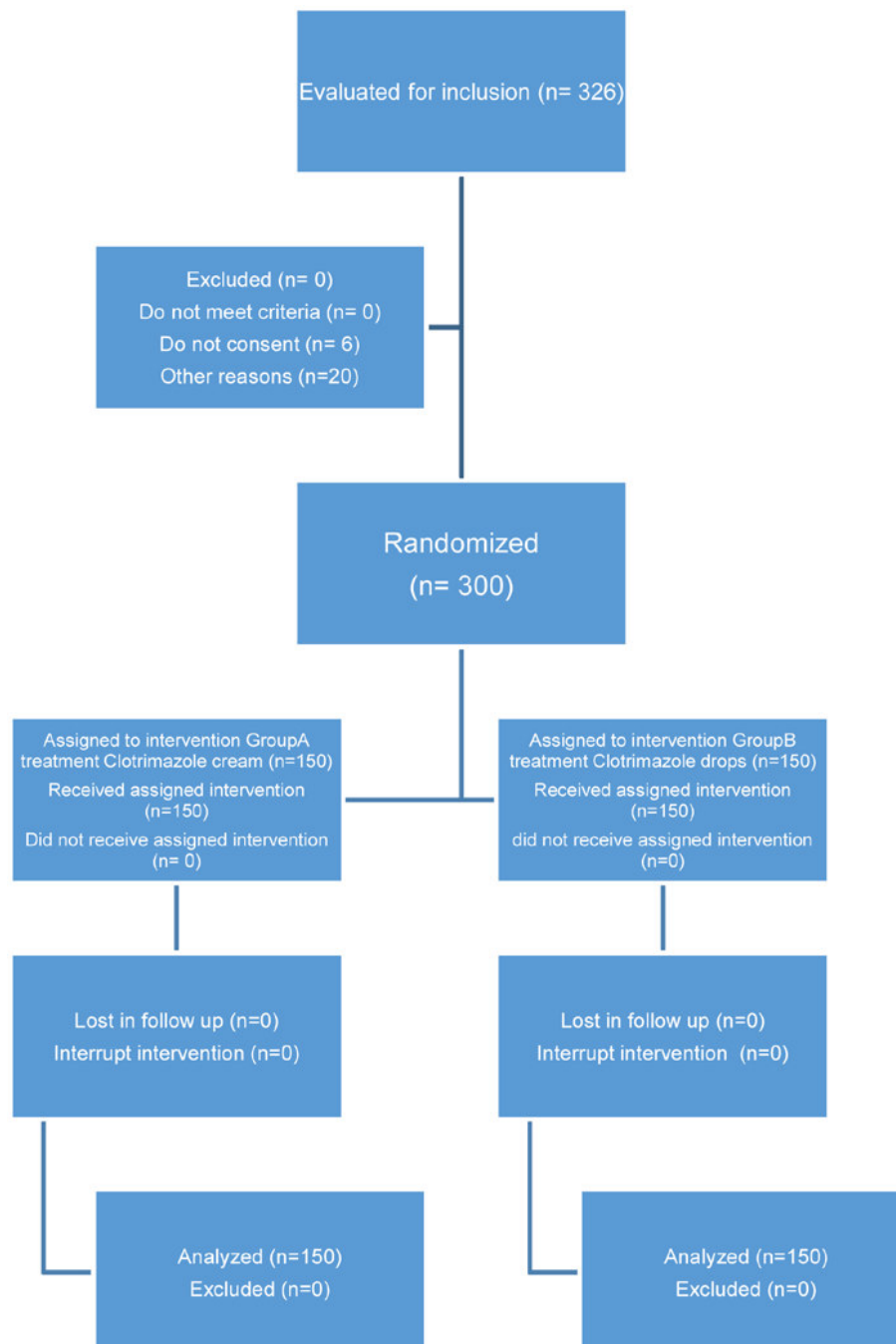
The ideal clinical result comprised of an asymptomatic patient with a clean and dry EAC affirmed through microscopic examination. In both groups, in case the infection proceeded, the EAC was cleaned once more and a second treatment with the same drug was done. Dry ear care and avoidance of identified predisposing factors were advised.

The degree of improvement was assessed by comparing the symptoms and findings within the physical examination each week as well as one week after the resolution of the infectious disease to assess resolution or relapse.

The data collected were entered into an SPSS database, demographic variables and baseline characteristics were analyzed, including measures of central tendency and data dispersion, analysis of categorical variables using Chi square and comparison of continuous variables with

Student's t-test. A  $p < 0.05$  was considered significant. An intention-to-treat analysis was conducted. Cases lost

to follow-up were considered as failures as long as follow-up visits were performed.



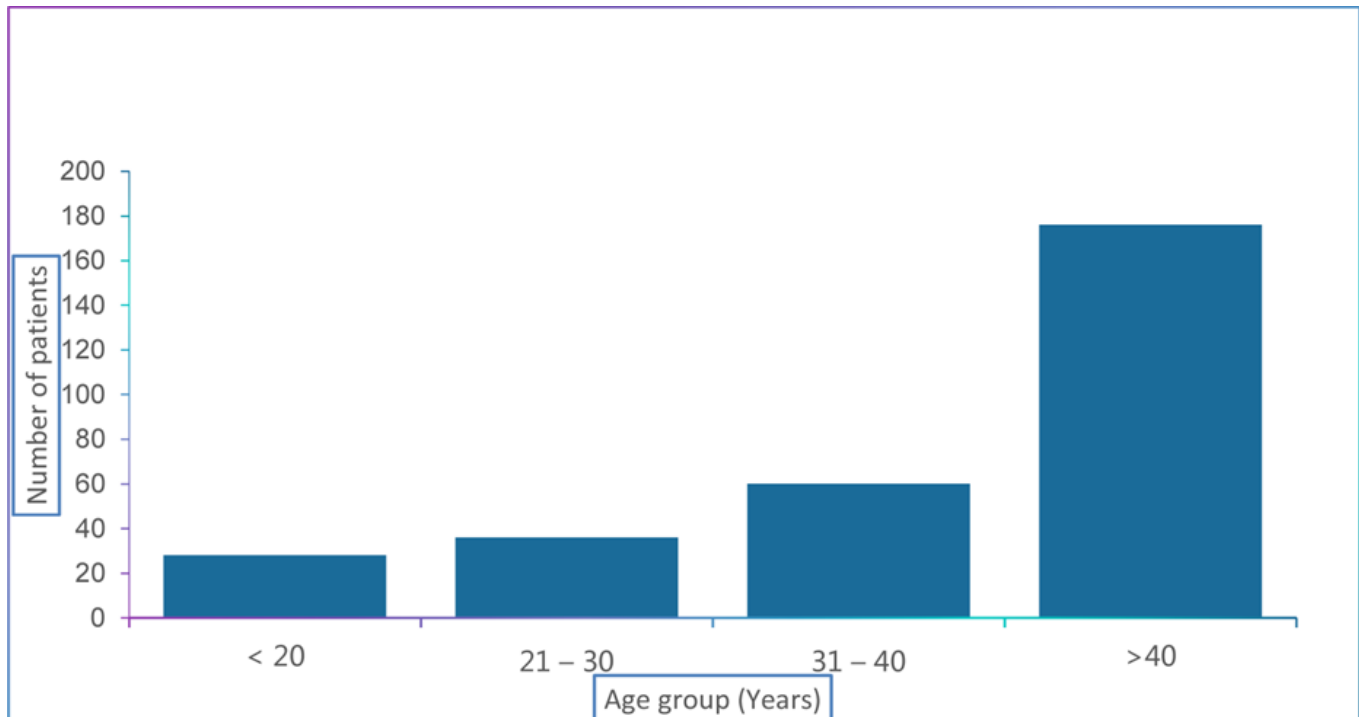
**Fig.1. Flow Chart of Method**

## Results

There were 300 otomycosis patients in the current research.

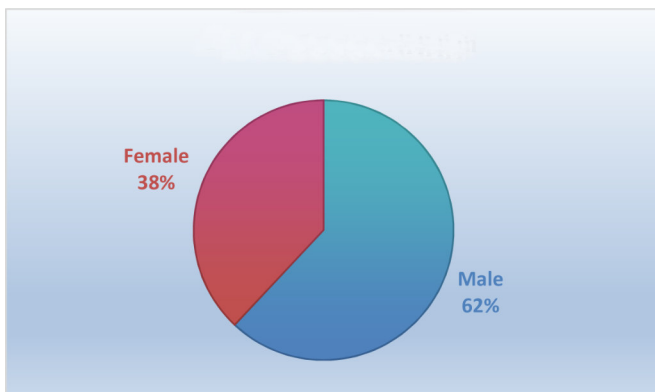
Age : In the current study, 176 patients (58.66%) were

under 50 years old, 60 cases (20%) were between the ages of 31 and 40, 36 cases (12%) were between the ages of 21 and 30, and 28 cases (9.33%) were between the ages of <20. The research participants' average age was 36.4 years.



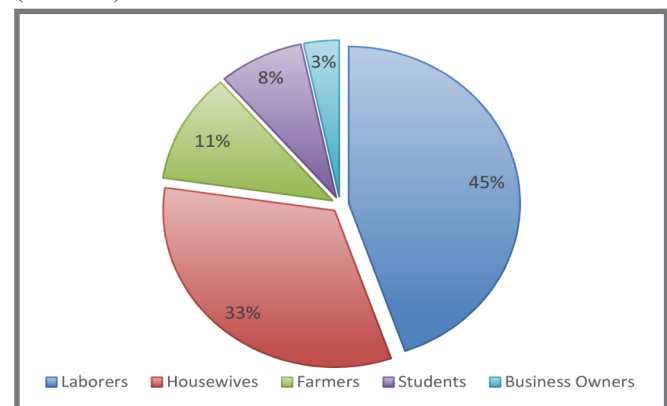
**Fig. 2. Age Distribution**

Gender : Of the participants in this study, 186 (62%) were men and 114 (38%) were women.



**Fig. 3. Gender Distribution**

Occupation: 98 (32.66%) of the study's participants were housewives, 134 (44.66%) were laborers, 24 (8%) were students, 10 (3.33%) were business owners, and 34 (11.33%) were farmers.



**Fig. 4. Occupational Distribution**

Presenting Complaints: Right ear pain accounted for 256 (85.3%) of the study's participants' most commonly presenting complaints.

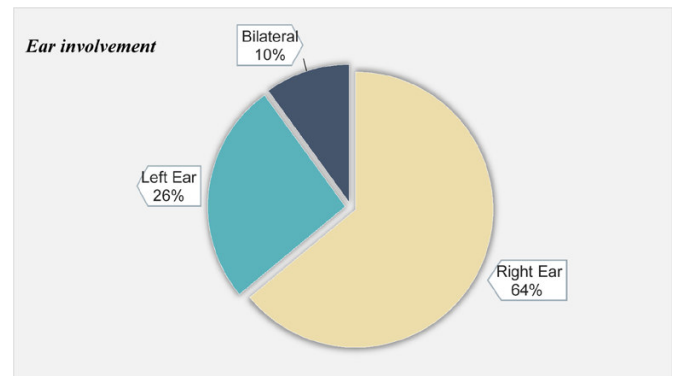
**Table I: Distribution in study group as per presenting complaints**

PRESENTING COMPLAINTS	NUMBER	PERCENTAGE (%)
Pain in right ear	256	85.3
Pain in left ear	40	13.33
Pain in both ears	04	1.4
Itching in left ear	32	10.67
Itching in right ear	127	42.33
Itching in both ear	07	2.33
Aural fullness in right ear	198	66
Aural fullness in left ear	26	8.67
Aural fullness in both ear	02	0.7
Decreased hearing in right ear	19	6.33

Wax: Only 24 (8%) of the patients in this research had wax present in addition to their fungal infection, and 276 (92%) had only fungal debris visible during an otoscopic examination of their EAC.

Division of Laterality: In the current study, 270 patients (90%) had unilateral otomycosis, of which 192 (71.11%) cases involved the right ear and 78 (28.88%) involved the left ear. The remaining 30 patients (10%) had bilateral involvement.

Distribution of Fungi: *Aspergillus Niger* was the most frequently isolated organism in the current investigation, occurring in 164 (54.66%) of the patients; *Candida albicans* was observed in 78 (26%), *Aspergillus fumigatus* in 38 (12.6%), and *Aspergillus flavus* in 20 (6.66%) of the patients.



**Fig. 4. Division of Laterality**

**Table II. Distribution in study group according to isolated organisms**

ISOLATED ORGANISMS	NUMBER	PERCENTAGE
<i>Aspergillus niger</i>	164	54.66
<i>Candida albicans</i>	78	26
<i>Aspergillus fumigatus</i>	38	12.6
<i>Aspergillus flavus</i>	20	6.66
<b>Total</b>	<b>300</b>	<b>100</b>

Signs at the end of one week: After one week in the current study, 147 (98%) of the patients with persistent symptoms while on clotrimazole cream had no fungal debris and were asymptomatic, while 129 (86%), of the patients receiving clotrimazole drops had no fungal debris and were asymptomatic.

After updating the contingency table with the number of recurrences for each group, the chi-square statistic for all outcomes is approximately 34.394, with a p-value less than 0.001. This indicates a significant association between the type of treatment (Clotrimazole cream vs. Clotrimazole drops) and all observed outcomes, including resolution after the first, second, and fourth weeks of treatment, as well as the number of recurrences.

**Table III. Comparison of treatment results in patients with Clotrimazole cream and Clotrimazole ear drops treatments**

	<b>GROUP 1 CLOTRIMAZOLE CREAM (n = 150)</b>	<b>GROUP 2 CLOTRIMAZOLE DROPS (n = 150)</b>	<b>p-VALUE</b>
<b>Resolution after 1st week of treatment</b>	<b>147</b>	<b>129</b>	<b>0.037</b>
<b>Additional patients with resolution after 2nd week of treatment</b>	<b>3</b>	<b>21</b>	<b>&lt;0.001</b>
<b>Change in treatment</b>	<b>0</b>	<b>0</b>	<b>&lt;0.001</b>
<b>Number of recurrences</b>	<b>3</b>	<b>21</b>	<b>&lt;0.001</b>
<b>Complications</b>	<b>0</b>	<b>0</b>	<b>&lt;0.001</b>

## Discussion

Otomycosis, a word for fungal infection of the external auditory canal, is commonly reported by ENT doctors and is diagnosed based on clinical presentation. The two most common fungi that have been linked to otomycosis pathogenic saprophytes are *Aspergillus* and *Candida*.<sup>17,18</sup>

*Aspergillus* species accounted for 54.66% and *Candida albicans* for 26% of the etiological agents identified in this investigation. *Aspergillus* 41.1% (*A. Niger* 36.9%) and *Candida albicans* 8.2% were identified from 72 individuals in the investigation by Kour et al.<sup>19</sup>

Otomycosis can be treated in a number of ways, with some studies finding that azoles are particularly helpful in this regard. To examine the effectiveness of both drugs in a controlled clinical trial, it was chosen to compare the treatment of otomycosis with Clotrimazole Ointment vs Clotrimazole Ear Drops in the current study.<sup>20,21</sup>

Clotrimazole, an imidazole antifungal agent, exerts its effect by inhibiting the cytochrome P450 enzyme lanosterol 14- $\alpha$ -demethylase, which is involved in ergosterol biosynthesis, an essential component of the fungal cell membrane. This inhibition disrupts membrane integrity, increases permeability, and ultimately causes fungal cell death<sup>22</sup>. According to the Malik<sup>23</sup> research, in terms of antifungals, the imidazole group demonstrated

an 80% resolution rate in the first application with a negligible chance of recurrence.

Studies by Vega-Nava CT et al. (2015)<sup>24</sup> Jadhav VJ et al. (2003)<sup>25</sup> Khan F et al. (2013), and Mun guía R (2008) demonstrated 50–100% efficacy rates of clotrimazole.

Clotrimazole is also listed by Jackman A as the most often used and efficient treatment.<sup>26</sup> In this study, 147 patients (98.0%) receiving therapy with a single dosage of clotrimazole cream and 129 (86%) receiving treatment with clotrimazole drops were symptom-free at the end of the first week following treatment. At the end of the first and four weeks of follow-up, the current study demonstrated a considerable improvement in symptoms with a single dosage of clotrimazole cream in cases of otomycosis. This is consistent with a research by Paulose KO, et al. (1989),<sup>27</sup> who discovered that clotrimazole treatment resulted in an improvement of 89%. Treatment failure rates ranged from 9 to 17%, according to studies by Jia X et al. (2012),<sup>28</sup> Anwar K (2014),<sup>29</sup> Nemati S et al. (2014),<sup>30</sup> and Naqi S et al. (2014).<sup>31</sup>

A comparative histological study done by Hamishehkar H, et al. (2015) discovered that Occlusive products can enormously influence skin hydration by forming a barrier on the skin following the topical administration of oil-based

formulations. These products repair the skin barrier by restoring the skin lipids as well.<sup>32</sup>

Another study conducted by Hongbo Zhai and Howard I. Maibach in 2002 concluded that Occluded skin sites had a significant increase in *Trans-epidermal Water Loss* (TEWL) values (every-day and alternate-day schedule) when compared to unoccluded sites. Results indicated that post-exposure occlusive treatment markedly enhanced irritant response<sup>33</sup>.

These results are consistent with our study, which found that 98% of cases treated with Clotrimazole cream resolved completely after one week of treatment; only 2% of Clotrimazole patients experienced recurrence, and the infection was treated with one more week of treatment without requiring a change in treatment; Clotrimazole application was also less expensive and easier for patients because it was done in the doctor's office and patients had weekly check-ups.

Additionally, following the first week of therapy, there was a significant difference in the resolution of otomycosis between the two treatment groups. Because the clotrimazole drops were administered at home once every 6 hours for 7 days, more patient adherence was necessary.

Since the cream covers the entire extent of the EAC skin and is in contact with this surface for a longer period than the drops, it is likely more effective than the latter. Additionally ear packing with cream forms an occlusive layer which may markedly enhance absorption of the drug and proving to be more beneficial than the drops.

The primary limitation of these investigations was the lack of treatment blinding, wherein patients as well as doctors were cognizant of the allocated treatment. Since topical drops were used at home for one group of patients and cream was administered at the doctor's office for the other, blinding became challenging when there were differences in treatment presentations. Additionally, the patient had to comply with the latter therapy more, which was evaluated at follow-up visits.

Further randomized controlled studies are required to validate our findings because our sample size is modest.

## Conclusion

The therapy of otomycosis was shown to be slightly more effective with clotrimazole cream and drop regimens. Since *Aspergillus* species and *Candida albicans* are the most prevalent causes of otomycosis, our findings support the use of clotrimazole cream as a therapy for otomycosis due to its cost-effectiveness and adequate pharmacological effect. Resistance-developing organisms may be minimized with the administration of such therapy.

## References

1. Fasunla J, Ibekwe T, Onakoya P. Otomycosis in western Nigeria. *Mycoses*. 2008;51(1):67–70
2. Agarwal P, Devi LS. Otomycosis in a rural community attending a tertiary care hospital: assessment of risk factors and identification of fungal and bacterial agents. *J Clin Diagn Res*. 2017;11(7):DC14–DC18
3. Mofatteh MR, Naseripour Yazdi Z, Yousefifi M, Emami M, Zahir S. Comparison of the recovery rate of otomycosis using betadine and clotrimazole topical treatment. *Braz J Otorhinolaryngol*. 2018;84(4):404–409
4. Kazemi A, Majidinia M, Jaafari A, Fazeli MR, Ghadiri M. Etiologic agents of otomycosis in the Northwestern area of Iran. *Jundishapur J Microbiol*. 2015;8(1):e21776
5. Vlastarakos PV, Nikolopoulos TP, Manolopoulos L, Kandiloros D, Nikolopoulos A, Ferekidis E, Helidonis E. Treating common ear problems in pregnancy: what is safe. *Eur Arch Otorhinolaryngol*. 2008;265(2):139–145
6. Mahmoudabadi AZ, Mahmoudabadi ZA. Mycological studies in 15 cases of otomycosis. *Pak J Med Sci*. 2006;22(4):486
7. Prasad SC, Kotigadde S, Shekhar M, Aruna M, Raju G, Bhat P, Rao BKN. Primary otomycosis in the Indian subcontinent: predisposing factors, microbiology, and classification. *Int J Microbiol*. 2014;2014:741075
8. Deguine C, Pulec JL. Otomycosis with pus (Otoscope Clinic). *Ear Nose Throat J*. 2002;81(7):428–429
9. Pontes ZBVS, Silva ADF, Lima EO, Ferreira LL, Matos JDO, Bezerra JC, Barreto NRM, Sousa Jr M. Otomycosis: a retrospective study. *Braz J Otorhinolaryngol*. 2009;75(3):367–370
10. Munguia R, Daniel SJ. Otological antifungals and otomycosis: a review. *Int J Pediatr Otorhinolaryngol*. 2008;72(4):453–459
11. Pakshir K, Sabayan B, Javan H, Masoumi SZ, Kamali M. Mycoflora of human external auditory canal in Shiraz, southern Iran. *Iran Red Crescent Med J*. 2008;10(1):27–29

12. Ho T, Vrabec JT, Yoo D, Cohen S. Otomycosis: clinical features and treatment implications. *Otolaryngol Head Neck Surg.* 2006;135(5):787–791
13. Jackman A, Ward R, April M, Green D, Levine S. Topical antibiotic-induced otomycosis. *Int J Pediatr Otorhinolaryngol.* 2005;69(6):857–861
14. Navaneethan N, YaadhavaKrishnan RPD. Type of antifungals: does it matter in empirical treatment of otomycosis. *Indian J Otolaryngol Head Neck Surg.* 2015;67(1):64–67
15. Dunder R, Ýnyen Ý. Single dose topical application of clotrimazole for the treatment of otomycosis: is this enough? *J Audiol Otol.* 2019;23(1):15–19
16. Herasym K, Bonaparte JP, Kilty S. A comparison of Locacorten Vioform and clotrimazole in otomycosis: a systematic review and one way meta analysis. *Laryngoscope.* 2016;126(6):1411–1419
17. Ong Y, Chee G. Infections of the external ear. *Ann Acad Med Singap.* 2005;34(4):330–334
18. Pradhan B, Tuladhar NR, Amatya RM. Prevalence of otomycosis in outpatient department of otolaryngology in Tribhuvan University Teaching Hospital, Kathmandu, Nepal. *Ann Otol Rhinol Laryngol.* 2003;112(4):384–387
19. Kaur R, Mittal N, Kakkar M, Chawla A. Otomycosis: a clinicomycologic study. *Ear Nose Throat J.* 2000;79(8):606–610
20. Jimenez Garcia L, Celis Aguilar E, Díaz Pavón G, Benavides Fresneda Y, Mendez Rios G. Efficacy of topical clotrimazole vs topical tolnaftate in the treatment of otomycosis. *Braz J Otorhinolaryngol.* 2020;86(3):300–305
21. Crowley PD, Gallagher HC. Clotrimazole as a pharmaceutical: past, present and future. *J Appl Microbiol.* 2014;117(3):611–617
22. Khatter N, Khan MAB. Clotrimazole. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jul 17 [cited 2025 May 10]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK560643/>
23. Malik AA, Malik SN, Aslam MA, Ahmed S. Comparative efficacy of topical clotrimazole and 3% salicylic acid in otomycosis. *Rawal Med J.* 2012;37(1):46–49
24. Ologe FE, Nwabuisi C. Treatment outcome of otomycosis in Ilorin, Nigeria. *West Afr J Med.* 2002;21(1):34–36
25. Khan F, Muhammad R, Khan MR. Efficacy of topical clotrimazole in treatment of otomycosis. *J Ayub Med Coll Abbottabad.* 2013;25(1–2):78–80
26. Vega Nava CT, Borrego Montoya CR, Vásquez del Mercado E, López Gutiérrez RM, Cerón Guevara MA. Otitis externa de origen fúngico. *An Otorrinolaringol Mex.* 2015;60(3):175–180
27. Paulose KO, Al Khalifa S, Shenoy P, Salam M, Mehta Y. Mycotic infection of the ear (otomycosis): a prospective study. *J Laryngol Otol.* 1989;103(1):30–35
28. Jia X, Liang Q, Chi F, Ye J. Otomycosis in Shanghai: aetiology, clinical features and therapy. *Mycoses.* 2012;55(5):404–409
29. Anwar K, Gohar MS. Otomycosis: clinical features, predisposing factors and treatment implications. *Pak J Med Sci.* 2014;30(3):566–571
30. Nemati S, Hassanzadeh R, Jahromi SK, Asadpour M. Otomycosis in the north of Iran: common pathogens and resistance to antifungal agents. *Eur Arch Otorhinolaryngol.* 2014;271(5):953–959
31. Naqi S, Bashir F, Khan A, Jabeen S, Khan I. Topical clotrimazole remains an effective treatment of otomycosis. *Proc Shaikh Zayed Postgrad Med Inst.* 2014;28(1):39–43
32. Hamishehkar H, Same S, Adibkia K, Javadzadeh Y. A comparative histological study on the skin occlusion performance of a cream made of solid lipid nanoparticles and Vaseline. *Res Pharm Sci.* 2015;10(5):378–387
33. Zhai H, Maibach HI. Occlusion vs skin barrier function. *Skin Res Technol.* 2002;8(1):1–6.



# Assessment of Hearing Loss and Its Correlates among Industrial Workers of Kanpur

<https://doi.org/10.47210/bjohns.2026.v34i1.272>

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## ABSTRACT

### Introduction

Prolonged noise exposure poses a substantial risk to public health, resulting in noise induced hearing loss. This purpose of this study to assess the magnitude of occupational noise induced hearing loss and to study its correlation with various contributing factors.

### Materials and Methods

A prospective longitudinal study was conducted on 426 industrial workers, aged 18-55 years, predominantly men (mean age  $39.83 \pm 0.76$  yrs), exposed to noise levels of 85 dB or higher. Hearing assessments were conducted by Pure Tone Audiometry at time of presentation and followed up at 3, 6 and 12 months.

### Results

Hearing loss affected 39.7% (169/426) of workers, mainly aged 30–50 yrs, with mild bilateral sensorineural impairment. A statistically significant association was found with noise exposure duration, intensity, and daily working hours. However, one-year follow-up showed no correlation, indicating that long-term exposure is key to hearing loss development.

### Conclusion

The study highlights the need for regular hearing assessments, mandatory use of protection devices, and stronger conservation measures, as prolonged noise exposure, long work hours, and high sound levels significantly increase hearing loss risk.

### Keywords

Noise; Noise Induced Hearing Loss; Pure Tone Audiometry; Sensorineural Hearing Loss

Occupational noise induced hearing loss (ONHL) is decreased auditory acuity as a result of multifactorial damage to auditory structures following exposure to occupational noise, environmental or recreational source of loud sound. It can result from exposure to either a single extremely loud sound or repeated exposure to loud sound over time.

The World Health Organisation (WHO)<sup>1</sup> reports that 15% of workers globally are exposed to noise levels exceeding 90 decibels (dB). National Institute for Occupational Safety and Health (NIOSH) notes that 14% of workers in developed countries face similar exposure. To mitigate this risk, the recommended guidelines suggest limiting occupational noise exposure to 85dB or less, averaged over an 8-hour period with a 3dB exchange rate.<sup>2</sup>

Noise induced hearing loss (NIHL) is a Bilateral Sensorineural hearing loss, symmetrically affecting high frequencies at 4kHz with/without dip later involving 3 kHz and 6 kHz with hearing recovery at 8 kHz. It can also involve lower frequencies 0.5, 1, 2 kHz.<sup>3</sup> Men are disproportionately affected compared to women, which is attributed to differences in occupational categories and variations in lifetime work history.

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High-intensity sound exposure can lead to reduced blood flow in the cochlea, resulting in cochlear hypoxia.<sup>4</sup> This stress triggers an excessive release of glutamate, disrupting normal cellular function.<sup>5</sup> The outer hair cells, being more susceptible to damage than inner hair cells, can undergo apoptosis or necrosis due to the harmful effects of reactive oxygen species (ROS) contributes to hearing loss.

Patient presents with features of aural fullness, tinnitus, dizziness, earache, lack of concentration, sleep disturbances, depression, inability to hear high pitched sound with difficulty to percept speech in noisy environment, high blood pressure, increased heart rate, obstructs ability to hear warning signals, react to environmental sounds and coordinate with coworkers; thereby posing threats to workers safety.

Diagnosis can be made by Tympanometry, Speech in noise testing, Distortion Product Otoacoustic Emission (DPOAE), Auditory Brainstem Response (ABR).

The clinical management involves the use of hearing protection devices and in severe cases, cochlear implants. Temporary threshold shift (TTS) monitoring enables timely pharmacological intervention such as intratympanic steroids like dexamethasone for acute noise induced TTS, although their long-term effectiveness is uncertain. Notably, this treatment is not recommended for chronic occupational noise exposure.<sup>6</sup> Certain antioxidants, including beta-carotene, vitamins B, C, E, zinc and magnesium have been found to reduce vasoconstriction, hearing loss and cochlear cell damage.<sup>7</sup> Hyperbaric oxygen therapy is also being explored to alleviate cochlear hypoxia.<sup>8</sup> However, the adoption of Hearing Protective Device can be challenging, particularly in military settings where they may compromise auditory situational awareness, including sound detection and localization and speech perception.<sup>9</sup>

Kanpur was known as Manchester of India and is key industrial belt of Uttar Pradesh which caters employment to approx. 1 lakh population of Kanpur in various industries. This government tertiary care centre

provides health services to numerous people belonging to and around Kanpur. Through this study, focusing on prevalence of NIHL and identifying associated factors and its correlation can help bridge gaps in knowledge and practice, ultimately contributing to development of targeted intervention and improved workplace safety standards with reduction in Years lived with Disability (YLD). Ultimately, eliminating ONIHL poses a significant, long-term challenge that necessitates a multifaceted approach at the individual, organizational policy and population level.

### Materials and Methods

The study is prospective longitudinal study involving a total of 426 workers aged 18-55 yrs underwent screening during a field visit and outpatient department evaluation at the ENT department of tertiary care centre, Kanpur. After obtaining ethical clearance and proper written informed consent, participants who met inclusion and exclusion criteria were included in the study. The workers with history of ear discharge, conductive hearing loss with and without otitis media (otitis externa, ossicular disruption, upper respiratory tract infection, trauma, ear wax) or diagnosed with presbycusis and other causes of Sensorineural hearing loss were excluded from the study.

Complete detailed history, ENT examination and systemic examination of workers was done. All the workers were subjected to otoscopic examination which was followed by Pure Tone Audiometry (PTA) and were followed up with serial audiometric evaluation at 3, 6 and 12 months. Intensity of noise in industries was measured by Sound meter app. The results were evaluated and hearing loss was classified according to WHO classification of degree of hearing impairment. Data obtained was recorded and sent for statistical analysis.

0 -	None	≥ 25 dB
1 -	Slight	26–40 dB
2 -	Moderate	41–60 dB
3 -	Severe	61–80 dB
4 -	Profound	≥ 81 dB

## Results

Table I : Demography and Prevalence of NIHL

GENDER DISTRIBUTION	NO. OF WORKERS	PERCENTAGE
Male	161	95.27%
Female	8	4.73%
Male to female ratio	20:1	
AGE DISTRIBUTION	NO. OF WORKERS	PERCENTAGE
18 to 20 Yr	6	1%
21 to 30 Yr	47	11%
31 to 40 Yr	151	36%
41 to 50 Yr	179	42%
51-55Yr	43	10%
Mean age in yrs	39.83 ± 0.76 yrs	
REGIONAL DISTRIBUTION	NO. OF WORKERS	PERCENTAGE
Rural	311	73%
Urban	115	27%
No. of workers screened	426	
No. of workers with HL	169	
Prevalence	39.67%	

Table II : Correlation Analysis : Age Group, Working Hours, Noise Exposure Duration

	NO. OF WORKERS	WORKERS WITH HL	WORKERS WITHOUT HL	PERCENTAGE POSITIVE
(I) Age Groups				
18 to 20 Yr	6	0	6	0%
21 to 30 Yr	47	7	40	14.89%
31 to 40 Yr	151	44	107	29.13%
41 to 50 Yr	179	75	104	41.89%
51-55Yr	43	33	10	76.74%
(ii) Working Hours Per Day				
8-10 Hours	92	12	80	13.04%
10-12 Hours	273	111	162	40.65%
>12 Hours	61	46	15	75.41%
(iii) Duration of noise exposure				
Less than 5 Yr	92	17	75	18.48%
5 to 10 Yr	122	39	83	31.97%
10 to 15 Yr	92	41	51	44.57%
15 to 20 Yr	101	53	48	52.48%
More than 20 Yr	19	15	4	78.94%

P value for working hours per day and duration of noise exposure

(ii)  $X^2 = 88.7$  Degree of freedom =4 pvalue = < 0.0001 (highly significant)

(iii)  $X^2 = 57.02$  Degree of freedom =4 p value = < 0.001 (highly significant)

Table III : Hearing Profile in Workers on Basis of Intensity of Sound

INTENSITY OF NOISE	NO. OF WORKERS EXPOSED	WORKERS WITH HL	PERCENTAGE POSITIVE
85-90 dB	74	10	13.51%
90-100 dB	100	20	20.00%
100-110 dB	146	57	39.04%
110-120 dB	106	82	77.36%

$X^2 = 40.78$  Degree of freedom =3 pvalue = <0.001 (highly significant)

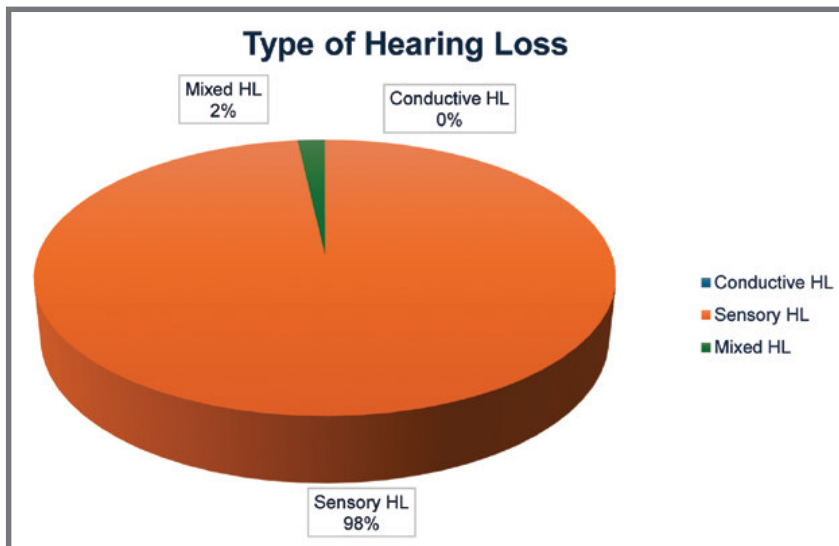


Fig. 1. Types of hearing loss

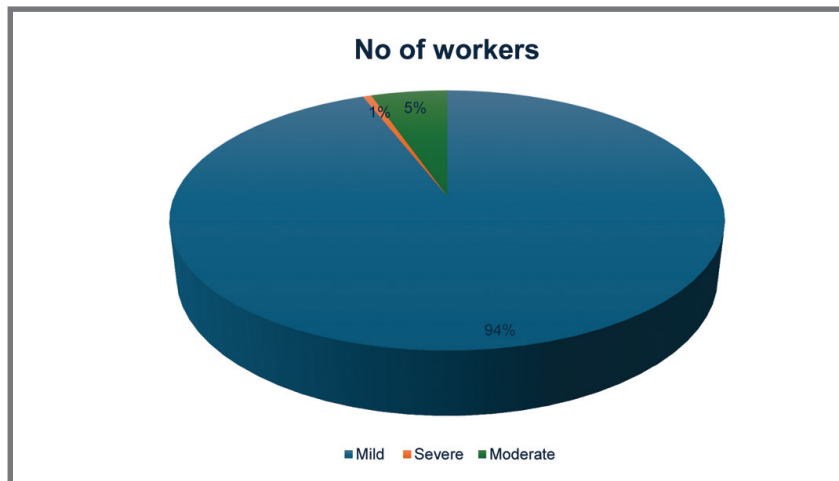


Fig. 2. Degree of hearing loss

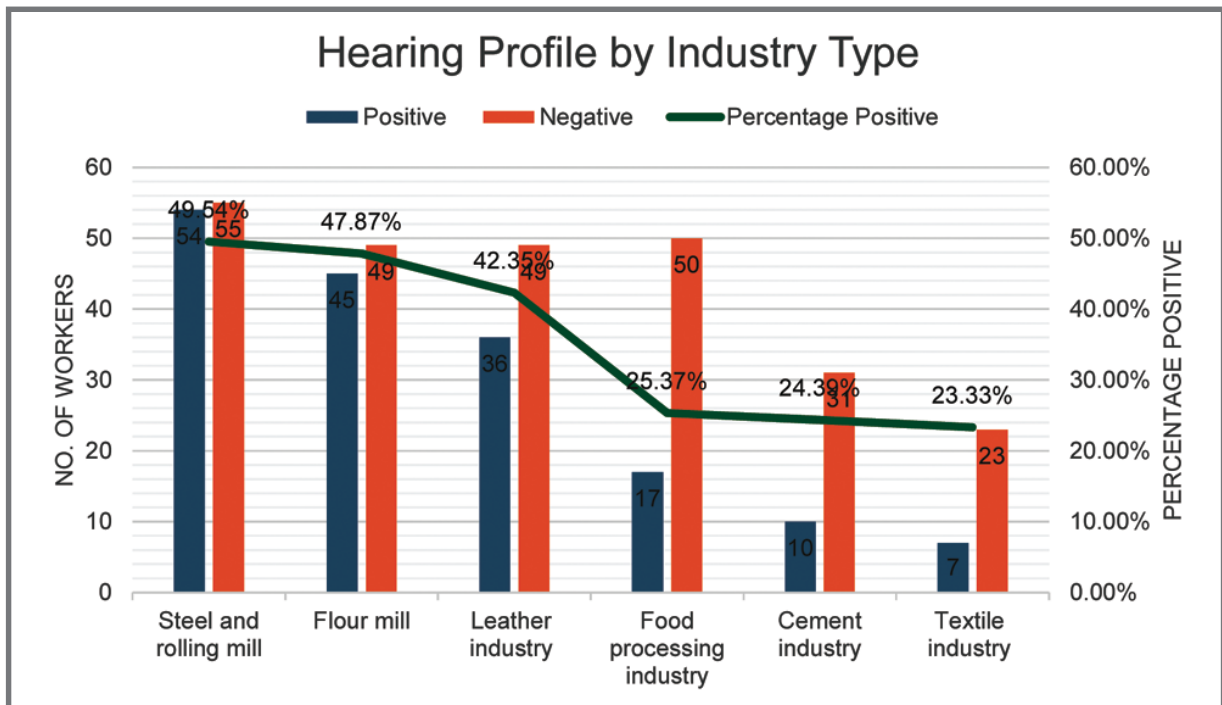


Fig. 3. Hearing profile by industry type

Table IV: Incidence of Hearing Loss on Follow up for One Year

DURATION OF STUDY	NO. OF WORKERS WITH POSITIVE AUDIOMETRIC VALUE
At time of presentation	165
3 Months	165
6 Months	166
12 Months	169

$X^2 = 3.97$  Degree of freedom = 3  
 pvalue = <0.26 (non significant)

426 industrial workers were screened to assess the prevalence and characteristics of noise-induced hearing loss (NIHL). Out of these, 169 workers (39.67%) were found to have hearing loss with a male predominance affecting 161 males (95.26%) compared to 8 females resulting in a male-to-female ratio of 24:1. The maximum

workers reside in rural areas (73%) as compared to rural areas (27%). The majority of affected workers were aged between 41 to 50 years (42%), followed by those aged 31 to 40 years (36%) (Table I).

Hearing loss was most prevalent in workers over 50 years old (99%), followed by those aged 41–50 years (59.21%) and 31–40 years (13.24%) attributing to fact that long duration of exposure is synergistic with hearing loss. Workers working for 10 hours daily showed significantly higher hearing loss ( $p < 0.0001$ ). Those with over 20 years showed the highest prevalence (99%), followed by those with 15–20 years of exposure (71%), confirming a strong correlation ( $p < 0.001$ ) between duration of exposure and NIHL (Table II).

Additionally, most workers were exposed to noise levels between 90–110 dB, but hearing loss peaked (77%) among those exposed to higher intensities of 110–120 dB, again showing a significant association ( $p < 0.001$ ). (Table III).

Audiometric assessments revealed that 98% had sensorineural hearing loss, with the condition being

predominantly mild (94.10%) followed by moderate hearing loss (5.30%) (Figure 1, Figure 2). Industry wise, the highest number of workers were from the steel sector 109 workers (25%) where nearly half (49.54%) experienced hearing loss (Figure 3).

A one-year follow-up recorded only four new cases of hearing loss, which was not statistically significant ( $p = 0.26$ ), suggesting that longer-term observation is needed to capture the effects of noise induced hearing loss, which often develops after several years of exposure (Table IV).

### Discussion

Our study revealed a substantial prevalence of hearing loss, affecting 39.6% of the workers (95% CI, error margin: 5%). The finding of present study is in support of studies done by Agarwal et al. (2015)<sup>10</sup> (46%) and is closest to the rate reported by Oliveria (2014) (36.07%).<sup>11</sup> In contrast to our study Ologe et al. (2006)<sup>12</sup> reported higher prevalence of 57%.

The current study found that ONIHL predominantly affects individuals in their 4th and 5th decades of life. This aligns with Pathak's<sup>13</sup> findings, which reported a high percentage of NIHL in the 40-45 years age groups. ONIHL affects older and middle-aged workers highlighting the fact that older workers are particularly vulnerable, as the cumulative effects of noise exposure over time contribute to this trend as per Sulkowski et al., study.<sup>14</sup> Contrary to present study Amedofu et al. (2017)<sup>15</sup> observed that most individuals with ONIHL fell within the 20-39 years age range.

The current study states that male to female ratio 20:1 highlighting male dominance. The result is synchronous with study conducted by Wang et al. (2021);<sup>16</sup> stating that noise induced hearing loss was significantly higher in males (34.4%). However, male preponderance can be attributed to fact that they are often employed in industries which has higher noise exposure, such as construction, manufacturing, and transportation, which may contribute to the higher incidence of ONIHL among them.

In our study majority workers experienced mild hearing loss (94.10%) followed by moderate hearing loss

(5.30%). Oliveria et al. (2014)<sup>11</sup> study favoured this observation which stated that 111 out of 116 subjects (95.68%) were mild hearing loss followed by 4 out of 116 subjects experienced moderate hearing loss (3.44%). Contrary to this Singh et al.<sup>17</sup> reported that majority had moderate hearing loss.

This study found that workers with over 10 years of work experience were more likely to develop hearing loss. This suggests that the longer the exposure to noise, the greater the risk of NIHL. This finding is supported by Bhattacharya et al.<sup>18</sup> The possible reason could be chronic noise exposure can cause permanent hearing loss by directly damaging hair cells in the cochlea, generating toxic free radicals, and leading to cell death. Aging can exacerbate this effect, as the cochlea's self regeneration ability is impaired, hair cell loss irreversible.<sup>19</sup>

Our study found that 166 out of 169 workers suffered from sensorineural hearing loss (SNHL), consistent with previous research. Ranga et al. (2014) Bukuru et al. (2019).<sup>20,21</sup> noted that chronic noise exposure affects the bilateral cochlea, leading to high-frequency SNHL with a 4 kHz notch. In this study, factors such as age, working experience, and working area noise level were positively associated with hearing loss.

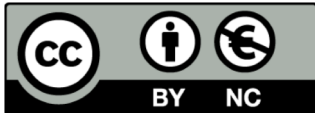
### Conclusion

The risk of hearing impairment among workers is significantly influenced by factors such as prolonged noise exposure, extended working hours, and high sound intensity. Regular auditory evaluations should be a mandatory component of workplace. Furthermore, strict enforcement of hearing protection device usage is crucial to ensure early detection and intervention for potential hearing issues, ultimately safeguarding the auditory health of workers.

### References

1. Toppila E, Koskinen, H, Pyykkö, I (2011) Hearing loss among classical-orchestra musicians. *Noise and Health* 13(50):45-50
2. Sriwattanatamma P, Breyse P (2000) Comparison of NIOSH

- noise criteria and OSHA hearing conservation criteria. *Am J Ind Med.* (4), 334-338
3. Lie A, Engdahl B, Hoffman HJ, Li CM et al. (2017) Occupational noise exposure, hearing loss, and notched audiograms in the HUNT Nord-Trøndelag hearing loss study, 1996-1998. *Laryngoscope.* 127(6):1442-1450
  4. Puel JL, Ruel J, Gervais d'Aldin C, Pujol R (1998) Excitotoxicity and repair of cochlear synapses after noise-trauma induced hearing loss. *Neuroreport.* 9(9):2109-2114
  5. Furness DN. (2015) Molecular basis of hair cell loss. *Cell Tissue Res.* (1):387-399
  6. Zhou Y, Zheng G, Zheng H, Zhou Ret al. (2013) Primary observation of early transtympanic steroid injection in patients with delayed treatment of noise- induced hearing loss. *Audiol Neurotol.* 18:89-94
  7. Choi YH, Miller JM, Tucker KL, Hu H et al. (2014) Antioxidant vitamins and magnesium and the risk of hearing loss in the US general population. *Am J Clin Nutr.*99:148-155
  8. Suzuki H, Hashida K, Nguyen KH, Hohchi N et al. (2012) Efficacy of intratympanic steroid administration on idiopathic sudden sensorineural hearing loss in comparison with hyperbaric oxygen therapy. *Laryngoscope.*122:1154-1157
  9. Smalt CJ, Calamia PT, Dumas AP, Perricone JP et al. (2020) The effect of hearing-protection devices on auditory situational awareness and listening effort. *Ear Hear.* 41:82-94
  10. Agarwal G, Nagpure PS, Gadge SV (2015) Noise Induced Hearing Loss in Steel Factory Workers. *Int J Occup Saf Health.* 4:34-43
  11. Oliveira A, Cacodcar J, Motghare DD (2014) Morbidity among iron ore mine workers in Goa. *Indian J Public Health.* 58:57-60
  12. Ologe FE, Akande TM, Olajide TG (2006) Occupational noise exposure and sensorineural hearing loss among workers of a steel rolling mill. *Eur Arch Otorhinolaryngol.*263:618-621
  13. Solanki JD, Mehta HB, Shah CJ, Gokhale PA (2013) Occupational noise-induced hearing loss: Is planning appropriate type of shift work for the workers the most practical potential preventive measure? *Indian J Otol.*19:155-156
  14. Sulkowski WJ, Szymczak W, Kowalska S, Sward-Matyja M (2004) Epidemiology of occupational noise-induced hearing loss (ONIHL) in Poland. *Otolaryngol Pol.*58(1):233-236
  15. Amedofu GK (2002) Hearing impairment among workers in a surface gold mining company in Ghana. *Afr J Health Sci.* 9:91-97
  16. Wang Q, Wang X, Yang L et al. (2021) Sex differences in noise-induced hearing loss: a cross-sectional study in China. *Biol Sex Differ.*12(1):24
  17. Singh LP, Bhardwaj A, Deepak KK (2013) Occupational noise-induced hearing loss in Indian steel industry workers: an exploratory study. *Hum Fact.* 55:411-424
  18. Bhattacharya SK, Saiyed HN, Roy A, Chatterjee SK (1981) Hearing acuity in weavers of a textile mill. *Indian J Med Res.*74:779-785
  19. Ravikumar A, Mohanty S, Senthil K, Raghunandan S (2004) Evoked otoacoustic emissions to detect early noise-induced hearing loss. *Indian J Otol.*10:7-16
  20. Ranga RK, Yadav SPS, Yadav A, Ranga SB et al. (2014) Prevalence of occupational noise-induced hearing loss in industrial workers. *Indian J Otol.* 20:115-118
  21. Bukuru J, Byiringiro F, Mukara BK, Twagirumukiza E et al. (2019) Prevalence of occupational noise-induced hearing loss among wood and metal workers of Gakiriro, Kigali city, Rwanda. *Public Health Bull.*1:20-25.



# Extra-Pulmonary Tuberculosis in ENT: A Case Series on the Overlooked Details

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## ABSTRACT

### Introduction

The importance of knowing the extra pulmonary manifestations of Tuberculosis (TB) in a country like India, which contributes the largest number of cases in the world, is extremely important in every speciality of medicine. The annual incidence is more than 10 million per year, with about 7.5 million newly diagnosed and 10.6 million total diagnosed cases in 2022. In 2022 alone, India accounted for 27% of the global burden of TB. We would like to address a few of these extra pulmonary manifestations, which should be given as much importance as pulmonary TB.

### Cases

We would like to discuss 3 cases of extra-pulmonary TB and the steps that we took for diagnosis of the same. The first case was TB laryngitis, the second one being a chronic retropharyngeal abscess secondary to TB, and the third being lupus vulgaris of the nose.

### Conclusion

The diagnostic algorithm of TB has been adequately described in NTEP. But to reach an adequate diagnosis, the onus lies on the clinician to recognise the features and symptoms of a case of extra pulmonary TB. The signs and symptoms on simple visual examination, endoscopy and x ray imaging must not be missed and a clinical diagnosis reached with the help of all 3.

### Keywords

Tuberculosis; TB; Pulmonary; Laryngitis; Retropharyngeal Abscess; Lupus; Extra Pulmonary

Dr Robert Koch discoverer *Mycobacterium tuberculosis* on March 24, 1882, there are evidence of tubercular infection in the study with human skeletons since thousands of years. It most commonly affects the lungs, but can affect almost all the organs of human body (extra pulmonary TB).<sup>1</sup>

The importance of knowing the extra pulmonary manifestations of TB in a country like India, which

contributes the largest number of cases in the world, is extremely important in every speciality of medicine. The National Tuberculosis Elimination Programme (NTEP), previously known as Revised National Tuberculosis Control Programme (RNTCP), aims to strategically reduce TB burden in India by 2025, five years ahead of the Sustainable Development Goals. But in spite of government support, the disease takes a huge toll on mortality and morbidity in India.<sup>2</sup>

In fact, the Global Tuberculosis Report 2024, published by the World Health Organization (WHO) on 29th October 2024 revealed that 8.2 million people were newly diagnosed with TB in 2023, the highest number recorded since WHO began monitoring TB in 1995, and India still having the highest disease burden (26%).<sup>3</sup>

Although the diagnosis of pulmonary TB is a differential that is always considered, but many times the diagnosis of extra-pulmonary disease is missed. We would like to address a few of these extra pulmonary manifestations from an otorhinolaryngologist's point of view, which should be given as much importance.

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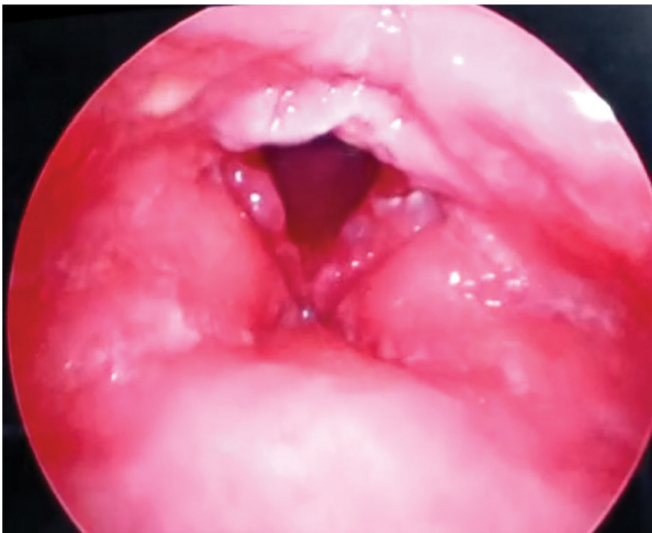
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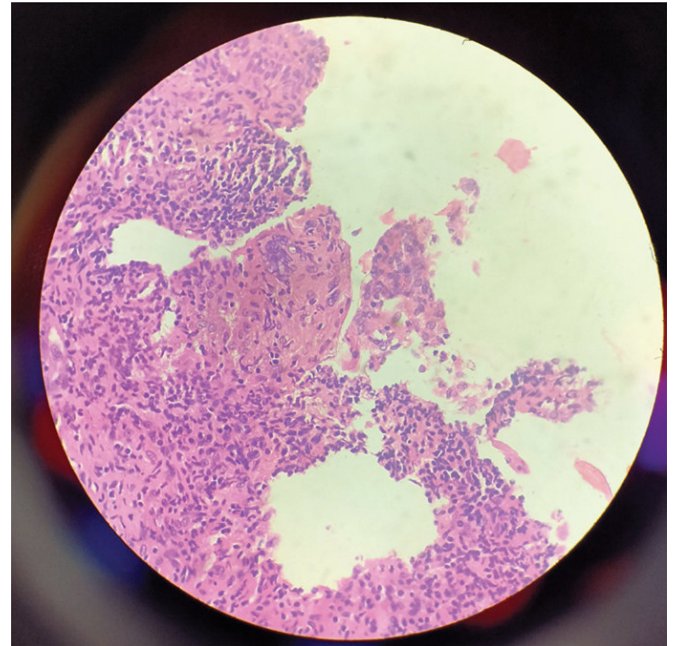
## Case Series

### Case 1

A 42-year-old male patient, diabetic, presented with complaints of sore throat, cough and hoarseness of voice for 2 months. The patient was apparently normal 3 months ago when he developed non-productive cough and low-grade fever with evening rise of temperature. Hoarseness of voice developed since 1 month, but there was no haemoptysis or dyspnoea. There was no history of weight loss. Ear, nose and oral cavity examination were within normal limits. Fibre optic laryngoscopy showed irregular mucosa on bilateral true vocal fold, arytenoid and aryepiglottic folds, with diffuse inflammation of the mucosa in the entire laryngeal inlet (Fig. 1). A CECT of the neck and thorax showed an irregular thick walled cavitary lesion in the left upper lobe of the lung, with multiple nodular opacities and subsegmental consolidation of left lingular lobe, while the neck region had no obvious abnormalities. A direct laryngoscopic biopsy under general anaesthesia was done, whose histopathological examination (HPE) showed features favouring granulomatous laryngitis (Fig. 2), and the Acid Fast Bacilli (AFB) stain of the same tissue was positive for acid fast bacilli. The patient was immediately started on anti-tubercular treatment (ATT).



**Fig.1.** Irregular mucosa on bilateral true vocal fold (mouse bitten appearance), arytenoid with diffuse inflammation of the laryngeal inlet



**Fig. 2.** Histopathological slide showing epithelioid histiocytes with giant cells and granuloma

### Case 2

A 59-year-old male presented with complaints of progressive dysphagia and foreign body sensation in the throat for 3 months, along with multiple swellings in the right lateral aspect of the neck. The dysphagia was not associated with odynophagia, hematemesis, or hoarseness of voice. The swellings in the lateral aspect of neck were discrete, firm, non-tender, mobile, present at lymph node levels 3, 4 and 5. There was no history of weight loss, fever or cough. Oral cavity examination and diagnostic nasal endoscopy showed a bulge on the posterior pharyngeal wall. An initial x-ray revealed a soft tissue bulge in the retropharyngeal C1-C4 region (Fig. 3). MRI neck done showed inflammation and an abscess in the C1-C4 region, with effacement of vertebrae (Fig. 4). FNAC was done from the retropharyngeal region via nasal endoscopy (Fig. 5) as well as from the neck swelling. The neck swelling showed features of tuberculous lymphadenitis, while the retropharyngeal swelling was suggestive of necrotizing inflammation. The patient was referred to the department of pulmonology and started on ATT.



Fig. 3. Soft tissue bulge in the retropharyngeal C1-C4 region

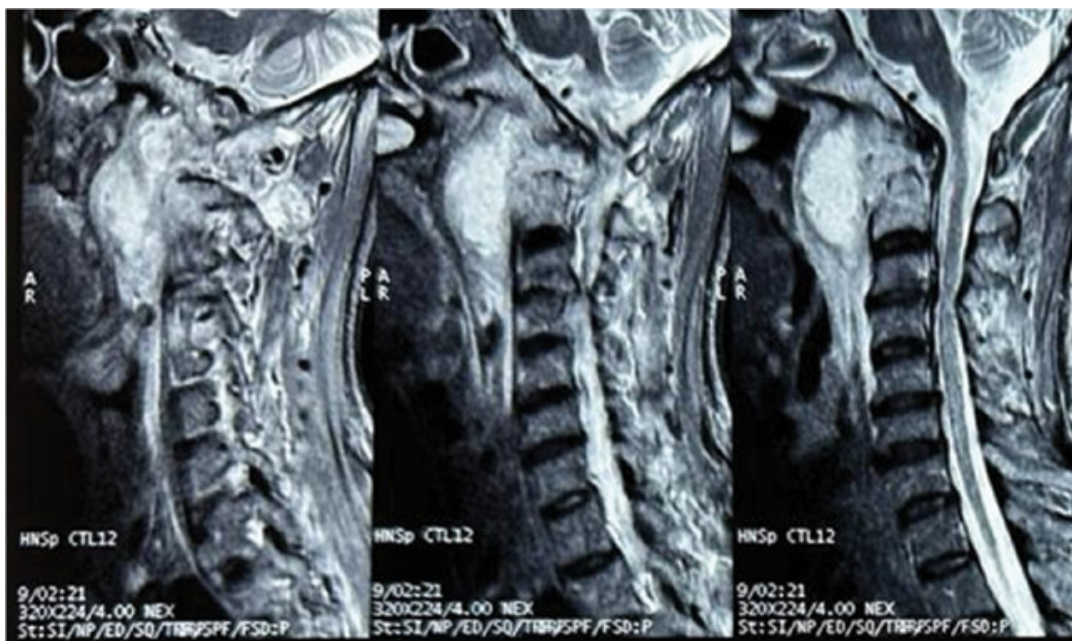
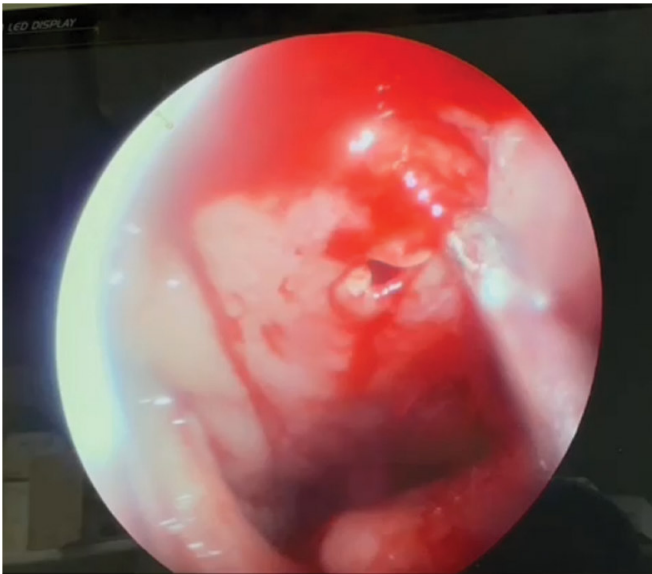


Fig. 4. Inflammation and an abscess in the C1-C4 region, with effacement of vertebrae on MRI



**Fig. 5. Nasal endoscopy picture of the posterior pharyngeal wall showing region from which FNAC was taken**

### Case 3

A 42-year-old male presented with epistaxis, itching over bilateral vestibules and a hyper pigmented spot over the tip of the nose and both alae for over a year. The pigmented macule was extending up to the septum. Anterior rhinoscopy also showed a separate ulcer over the septum on the left side. A nasal endoscopy did not reveal any new findings, and the rest of the ear, nose, throat and neck examination was within normal limits. There was no other positive history. Mantoux test was doubtful (8x8 mm induration). Sputum was negative for AFB. A deep biopsy from the lesion showed infiltrated inflammatory cells and epithelioid granulomas, with Langerhan's and foreign body giant cells. The patient was started on ATT for 6 months, leading to resolution of the lesion.

### Discussion

Tuberculosis (TB) is caused by *Mycobacterium tuberculosis*, and is known to affect all the tissues in the body. Of this, close to 80% affects the lungs and causes pulmonary tuberculosis. In 2022, TB was the world's second leading cause of death from a single infectious agent, second only to COVID-19, causing almost double

the number of deaths by HIV. The annual incidence is more than 10 million per year, with about 7.5 million newly diagnosed and 10.6 million total diagnosed cases in 2022. In 2022 alone, India accounted for 27% of the global burden of TB. Although close to a quarter of the global population is estimated to have been infected with TB, the risk of actually developing TB is approximately 5% in the first 2 years after exposure. Without treatment, the mortality may be as high as 50%.<sup>1</sup>

The most common extra-pulmonary manifestation of TB is lymphadenitis. Previously it was thought that 25-30% of patient with ENT TB have concomitant pulmonary TB, a trend which has later shown to decrease and lesser cases with pulmonary TB are seen now.<sup>4</sup>

As per the National Tuberculosis Elimination Programme and The Ministry of Health and Family Welfare (India), the various forms of extra-nodal ENT TB include laryngeal, sinonasal, oropharyngeal, para/retropharyngeal, salivary gland, thyroid gland, TB otitis media and TB mastoiditis. The most common of these is laryngeal TB, and vocal cords are commonly affected in the laryngeal form. Extra-nodal head and neck TB constitute <1% of all extrapulmonary TB cases.<sup>5</sup>

Laryngeal TB usually presents with symptoms of hoarseness, odynophagia and dysphagia, along with loss of weight and appetite. The most common presenting symptom is dysphonia which may be present in up to 100% of cases. The 2 theories that attempt to explain its etiology are The Bronchogenic Theory (larynx is infected by direct spread from the endobronchial tree) and The Hematogenous Theory (larynx is spread by hematogenous spread from sites other than the lungs). The laryngeal findings may range from edema, hyperaemia, nodularity, ulcerations and exophytic mass to obliteration of anatomic landmarks. Vocal fold fixation may occur. Hypertrophic, exophytic or polypoidal lesions are more common than ulcerative or granulomatous lesions. It may involve multiple subsites including the true vocal folds, epiglottis, false vocal folds and ventricle, arytenoid, inter-arytenoid area and subglottis. Classically it has been described as initially affecting the posterior part of the larynx and posterior commissure. Some of the named signs include:

1. Turban epiglottis: due to marked edema
2. Mouse bitten appearance: of vocal folds<sup>6-8</sup>

Retropharyngeal TB presents as a deep neck cold abscess. Tuberculous abscesses in the retropharyngeal area are rare, chronic and secondary to TB of the cervical spine, petrous apex or lung. Retropharyngeal abscesses normally occur in immunocompromised patients. Although acute retropharyngeal abscess is seen more commonly in children below 5 years age secondary to infections of adenoids, nasopharynx, posterior pharyngeal wall, sinuses and tonsils, chronic abscess is seen more commonly in adults, caused mainly due to tuberculous infection of the spine. Only about 1% of TB patients have skeletal TB, with 7% of these cases involving the cervical spine. This is because it is theorised that Pott's disease originates in the pelvic organs and disseminates via Batson's plexus to involve the lumbar, thoracic and cervical spine in decreasing order of frequency. Radiology is imperative to assess extent of the disease and the possible complications. On a plain x-ray of the cervical spine, on its lateral view, an abscess can be identified by measurements of more than 7mm in the retropharyngeal space at the lower border of C2. A retrotracheal space abscess is suspected on measurement of more than 14mm in children and 22 mm in adults, measured at C6. At computed tomography will help differentiate cellulitis from an abscess, while an MRI provides better visualisation of soft tissue and vascular complications. Any abscess in this region is of particular concern due to its connections with the mediastinum and deep neck spaces. Although surgical drainage improves symptoms, the mainstay of management is medical.<sup>9-11</sup>

Lupus vulgaris is one of the commonest forms of cutaneous tuberculosis, that occurs in people previously infected with TB. Cutaneous TB overall, occurs in only about 0.5% cases of disseminated TB. Other patterns include scrofuloderma, tuberculosis verrucosa cutis, primary inoculation tuberculosis, tuberculous gumma and metastatic tuberculous abscess. Lupus usually occurs as a result of dissemination (hematogenous, lymphatic, contiguous) from an endogenous focus during a period of lowered resistance. The primary may be from a

pulmonary or cervical focus, but may also be a quiescent complex elsewhere. Rarely it may occur due to BCG vaccination. Due the well demarcated reddish brown plaques with deep seated nodulation they become yellowish brown, often known as "apple jelly" nodules.<sup>12,13</sup>

### Conclusion

The diagnostic algorithm of TB has been adequately described in NTEP. But to reach an adequate diagnosis, the onus lies on the clinician to recognise the features and symptoms of a case of extra pulmonary TB. The signs and symptoms on simple visual examination, endoscopy and x ray imaging must not be missed and a clinical diagnosis reached with the help of all 3. A good pathologist is absolutely necessary to help diagnose the specimens sent, to not delay treatment. We have all been trained to appropriately detect pulmonary and extra pulmonary TB, but the practical application of the same is a must.

### References

1. World Health Organization. Global tuberculosis report 2023. World Health Organization; 2023
2. Akkara SA, Singhanian A, Akkara AG, Shah A, Adalja M, Chauhan N. A study of manifestations of extrapulmonary tuberculosis in the ENT region. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2014 Jan;66:46-50
3. Global Tuberculosis Report 2024 [Internet]. Who.int. 2024. Available from: <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2024>
4. Michael RC, Michael JS. Tuberculosis in otorhinolaryngology: clinical presentation and diagnostic challenges. *International journal of otolaryngology*. 2011;2011(1):686894
5. Training Module On Extrapulmonary Tuberculosis [Internet]. 2023 [cited 2024 Jul 29]. Available from: [https://tbcindia.mohfw.gov.in/wp-content/uploads/2023/05/7702334778Training\\_Module\\_on\\_Extrapulmonary\\_TB\\_-\\_Book\\_24032023.pdf](https://tbcindia.mohfw.gov.in/wp-content/uploads/2023/05/7702334778Training_Module_on_Extrapulmonary_TB_-_Book_24032023.pdf)
6. Yencha MW, Linfesty R, Blackmon A. Laryngeal tuberculosis. *American journal of otolaryngology*. 2000 Mar 1;21(2):122-6
7. Wang CC, Lin CC, Wang CP, Liu SA, Jiang RS. Laryngeal tuberculosis: a review of 26 cases. *Otolaryngology—Head and Neck Surgery*. 2007 Oct;137(4):582-8

8. Bhatia R, Varshney S, Bist SS, Singh RK, Gupta N, Gupta P. Tubercular laryngitis: case series. *Indian Journal of Otolaryngology and Head & Neck Surgery*. 2008 Dec;60:331-4
9. Kamath MP, Bhojwani KM, Kamath SU, Mahabala C, Agarwal S. Tuberculous retropharyngeal abscess. *Ear, nose & throat journal*. 2007 Apr;86(4):236-7
10. Wholey MH, Bruwer AJ, Baker Jr HL. The Lateral Roentgenogram of the Neck: (With Comments on the Atlanto-Odontoid-Basion Relationship). *Radiology*. 1958 Sep;71(3):350-6
11. Turk B, Akpınar M, Kaya KM, Turgut S. Retropharyngeal tuberculosis abscess: A case report and review of the literature. *Otorhinolaryngol Head Neck Surg*. 2018;10
12. Wozniacka A, Schwartz RA, Sysa Jedrzejowska A, Borun M, Arkuszewska C. Lupus vulgaris: report of two cases. *International journal of dermatology*. 2005 Apr;44(4):299-301
13. Marcoval J, Servitje O, Moreno A, Jucglá A, Peyrí J. Lupus vulgaris: Clinical, histopathologic, and bacteriologic study of 10 cases. *Journal of the American Academy of Dermatology*. 1992 Mar 1;26(3):404-7.



# Atypical Presentation of Fungal Skull Base Osteomyelitis: Middle Ear as the Primary Focus

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## ABSTRACT

### Introduction

Skull base osteomyelitis (SBO) is a complex condition seen in immunocompromised patients with severe mortality and morbidity. Fungal SBO is very rare and mostly sinogenic in origin. Otogenic (middle ear) fungal SBO is exceptionally rare. This case report details a case of atypical fungal SBO due to mucormycosis originating in the middle ear with its unusual clinical course.

### Case Report

A 60 year old male with uncontrolled diabetes mellitus presented with left ear pain and multiple cranial nerve palsies. Initial imaging was suggestive of pansinusitis with SBO. Histopathology confirmed mucormycosis exclusively in the middle ear granulation tissue, not the sinuses, pinpointing an otogenic primary source. The patient received antifungal therapy with management of Diabetes Mellitus and other co-existing medical issues.

### Discussion

This case highlights an extreme rare case of fungal skull base osteomyelitis from middle ear origin. It underscores the importance of histopathological examination given the initial misleading radiological findings. The patient showed a favourable response with medical management of Diabetes Mellitus and antifungal therapy despite his initial grim neurological presentation with multiple cerebral infarcts defying his grave prognosis.

### Conclusion

This case highlights that though fungal SBO aggressive symptoms and signs of fungal SBO can lead to severe complications. In spite of initial grim outlook, with vigilant management of underlying comorbid conditions and antifungal therapy there was remarkable clinical improvement.

### Keywords

Fungal Skull Base Osteomyelitis; Mucormycosis; Antifungal Therapy

Skull base osteomyelitis (SBO) is a life threatening disease causing severe morbidity and even mortality in affected individuals. It affects immunocompromised individuals particularly with diabetes mellitus. *Pseudomonas Aeruginosa* is the most common organism involved in the disease.<sup>1</sup> However, cases of fungal skull base osteomyelitis are encountered infrequently in clinical practice. Fungal skull base osteomyelitis reported in literature have been mostly due

to *Aspergillus* or *Scedosporium* species usually arising from contiguous external ear infection.<sup>2,3,4</sup> Fungal skull base osteomyelitis as a result of sinus infection in 55% cases was reported in a retrospective study.<sup>5</sup> Fungal skull base osteomyelitis is a rare entity. Interestingly fungal SBO secondary to otitis media is exceedingly rare. This case report highlights a presentation of fungal SBO due to mucor in a 60 year old patient with uncontrolled diabetes mellitus who presented with multiple cranial palsies, and initial work up was suggestive of pansinusitis with SBO, however it was only with histopathological examination which confirmed mucor solely in the middle ear granulation tissue. This case of fungal SBO secondary to

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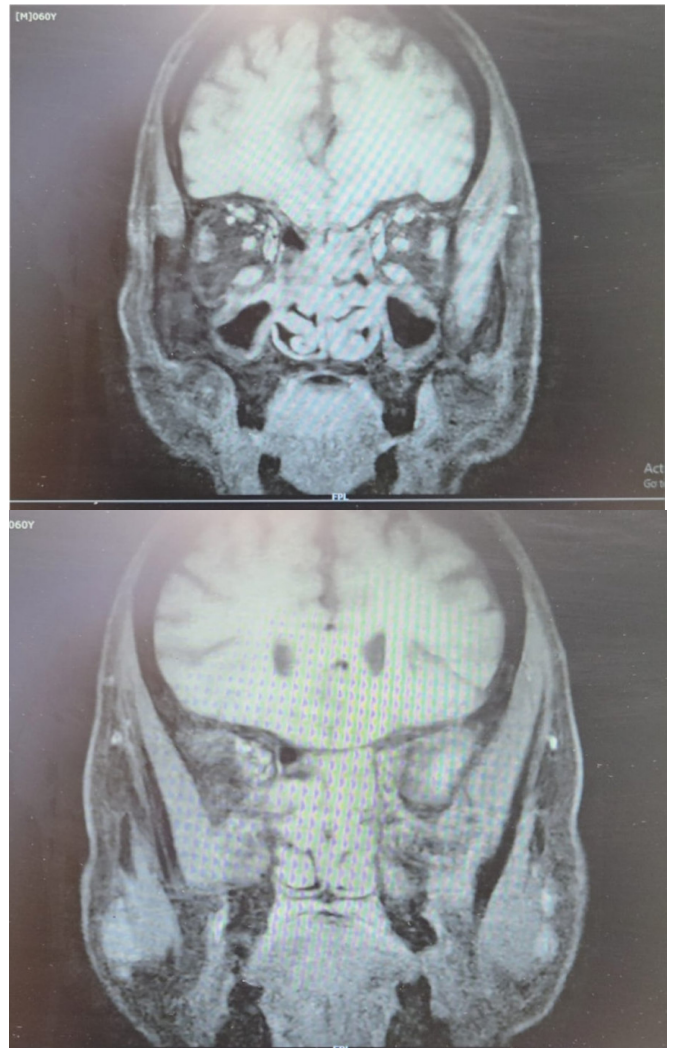
otitis media is a unique and interesting case in the context of fungal skull base osteomyelitis.

### Case History

A 60 year old farmer, who was a known case of Type II Diabetes Mellitus on irregular treatment presented to ENT OPD with left ear pain which was dull aching and with aggravation of pain at night since 5 days, left sided facial weakness, double vision, difficulty in chewing and swallowing since 3 days. Upon further inquiry he revealed a history of left ear discharge since childhood which was intermittent, profuse, mucoid, non foul-smelling and non blood stained and the last episode of ear discharge was 3 months back. Clinical examination revealed minimal purulent discharge in the left ear which was sent for gram staining and culture sensitivity. The tympanic membrane revealed a moderate sized perforation with protruding granulation tissue. Further clinical examination revealed a left side grade 4 lower motor neuron type of facial palsy (Figure 1), left lateral rectus palsy, deviation of tongue to left side on protrusion suggesting left hypoglossal nerve palsy, absent gag reflex, reduced movement of soft palate on the left side.



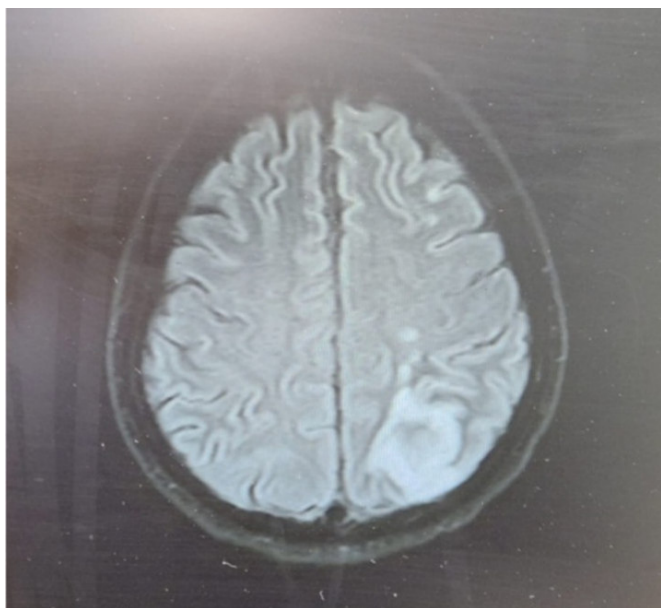
**Fig. 1. Clinical picture of patient with left facial palsy**



**Fig. 2a, 2b. MRI showing features of pan-sinusitis**

Diagnostic nasal endoscopy revealed normal mucosa without any discharge from the middle meatus. Videolaryngoscopy revealed normal vocal cord movements. A clinical diagnosis of skull base osteomyelitis with multiple cranial nerve palsies and uncontrolled diabetes mellitus was made. The patient was admitted in the intensive care unit as initial blood and urine work revealed very high blood sugar levels, dyselectrolytemia and a state of ketoacidosis. In the ICU the patient's condition deteriorated further and had to be put on ventilatory support. Concomitant medical issues were vigorously managed and Injection Meropenem was

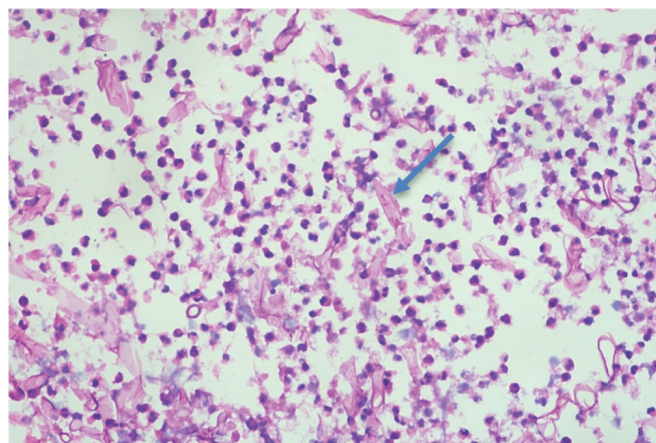
initiated as a part of management of SBO. MRI of brain and skull base revealed pansinusitis (Figure 2a, 2b) with features of skull base osteomyelitis with thrombosis of left internal carotid artery and also infarcts involving areas of left anterior cerebral artery/middle cerebral artery and middle cerebral artery/posterior cerebral artery territories (Figure 3).



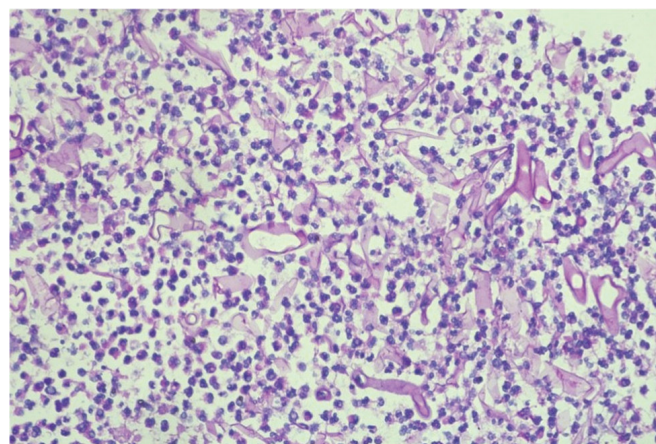
**Fig. 3. MRI brain showing infarcts in left middle cerebral artery/posterior cerebral artery territory**

A high resolution CT scan of the temporal bone revealed soft tissue opacification in the middle ear and partially in the mastoid. The air cell septations in the mastoid were maintained. The initial gram stain and culture from the left ear discharge revealed no growth or organism. Considering the imaging findings and the masked presentation of sinusitis, a fungal etiology was suspected, leading to the planning of a Functional Endoscopic Sinus Surgery (FESS). Concurrently, a plan was made to obtain and send tissue from the middle ear for histopathological examination during the same surgical setting. Intraoperatively, a pus sample from the right sphenoid sinus was collected and sent for Gram stain, culture, Ziehl-Neelsen (ZN) stain, and potassium hydroxide (KOH) mount. Sinus samples yielded no microbial growth/organisms. Further tissue samples from bilateral maxillary, anterior and posterior ethmoid sinus

were sent for HPE, which showed features of chronic non-specific inflammation. However, HPE of the granulation tissue obtained from the left ear revealed necro-inflammatory changes with broad, aseptate hyphae consistent with mucormycosis (Figure 4a). Periodic acid–Schiff (PAS) staining highlighted magenta-coloured fungal colonies characteristic of *Mucor* species (Figure 4b).



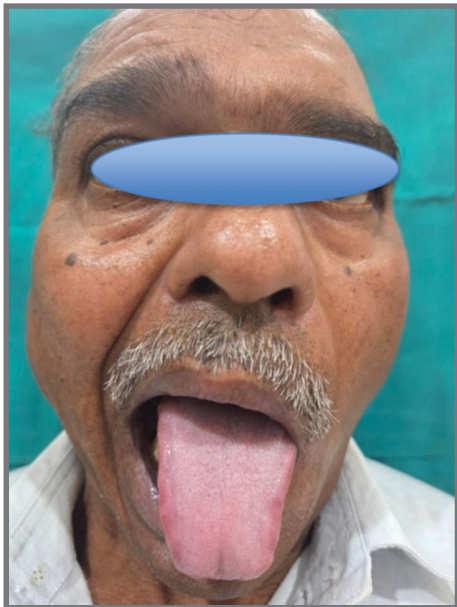
**Fig. 4a. Fungal hyphae, obtuse angled, broad and aseptate PAS Stain 4x**



**Fig. 4b. Fungal colonies PAS stain 4x**

The patient's clinical status improved, enabling extubation, a positive outcome achieved through stringent glucose and electrolyte management, and notably, occurring despite the initial grim MRI findings. Following the histopathological report confirming mucormycosis from the middle ear granulation tissue, the patient was initiated

on Liposomal Amphotericin B, which was administered for 14 days. Subsequently, oral Isavuconazole was commenced. Injection Meropenem was discontinued. The patient's general condition improved, and ear pain significantly reduced after the initiation of this treatment. The patient was discharged on oral Isavuconazole and other medical treatments for blood sugar and other coexisting medical issues. At the time of discharge, the granulation tissue from the middle ear was no longer present, and a moderate-sized perforation of the tympanic membrane was observed. There was slight improvement in tongue deviation, but the remainder of the cranial nerve examination findings remained consistent with the previous assessment. Surprisingly, on follow-up after three weeks of discharge, there was no tongue deviation (Figure 5), soft palate movements were normal, and the gag reflex was present. The patient came walking despite such extensive infarcts seen on initial imaging. He reported no ear pain or discharge and was carrying out day-to-day activities. The rest of the cranial nerve examination was almost the same. Repeated imaging could not be performed due to financial constraints, necessitating reliance on clinical signs and symptoms to assess treatment outcomes.



**Fig. 5. Improvement in hypoglossal nerve function on follow up**

## Discussion

Skull Base Osteomyelitis is a complex and troublesome condition requiring rigorous and long term management including management of underlying conditions. *Pseudomonas aeruginosa* is the most common organism in 90-98% of cases of SBO.<sup>6</sup> Fungi like *Candida* species, *Aspergillus* species, *Candida parapsilosis*, mucormycosis, Blastomycosis may also lead to SBO.<sup>2,7,8</sup> However, *Aspergillus* is the most common cause of fungal SBO in both immunocompromised and immunocompetent individuals.<sup>9</sup> These infections can lead to SBO either through contiguous spread of sinus or ear infection or hematogenous route. The pathophysiology of fungal SBO is less well understood and the complications of fungal SBO are more frequent than bacterial SBO<sup>10,11</sup> While SBO itself is a complex disease especially a fungal one adds a layer of diagnostic and therapeutic challenge. The diagnosis of fungal SBO is considered usually following failure of response to antibiotics.<sup>2</sup> The diagnosis requires microbiological confirmation. In our case despite the MRI showing extensive pan-sinusitis with SBO the pus samples from the sinus revealed no organism and histopathological examination of sinus mucosa only revealed chronic non-specific inflammation. In stark contrast the granulation tissue from the middle ear showed features of necro-inflammatory tissue with broad based hyphae suggestive of mucormycosis. This discrepancy strongly suggests the middle ear was the primary site of fungal infection. Blyth et al<sup>5</sup> in a retrospective study from 1990 to 2007 reported that out of 11 cases of fungal SBO only 2 had chronic otitis media, however the majority 54.5% were secondary to chronic sinusitis. This highlights an unusual primary site of infection.

For bacterial or fungal SBO the recommended treatment is 3-6 months of culture directed antibiotic or antifungal therapy.<sup>12,13</sup> Liposomal Amphotericin B with its lower nephrotoxicity is recommended<sup>12</sup> Aggressive surgical debridement is recommended by few clinicians for fungal SBO<sup>4</sup> in contrast to those with bacterial SBO.<sup>14</sup> In our case beyond functional endoscopic surgery no other aggressive debridement was done. The decision was influenced by the patient's remarkable and sustained clinical improvement with 2 weeks of liposomal

amphotericin B and continued oral Isavuconazole therapy as evidenced by reduction in ear pain, improvement of glossopharyngeal and hypoglossal nerve function. These improving clinical signs coupled with financial constraints preventing repeat imaging led to reliance on clinical assessment for observing treatment outcome and justified a more conservative approach.

### Conclusion

Fungal skull base osteomyelitis can originate from a middle ear infection, and is exceptionally rare compared to the more common sinogenic route. Therefore, this case serves as a critical reminder that while rare, fungal infections of the middle ear can lead to severe and widespread complications like skull base osteomyelitis, and should be considered in the differential diagnosis, especially in patients with predisposing factors.

### References

1. Di Lullo AM, Russo C, Grimaldi G, Capriglione P, Cantone E, Del Vecchio W, Motta G, Iengo M, Elefante A, Cavaliere M. Skull Base Fungal Osteomyelitis: A Case Report and Review of the Literature. *Ear Nose Throat J*. 2021 Dec;100(10\_suppl):1089S-1094S. doi: 10.1177/0145561320936006. Epub 2020 Jun 25. PMID: 32584614
2. Kountakis SE, Kemper Jr JV, Chang CJ, DiMaio DJ, Stiernberg CM. Osteomyelitis of the base of the skull secondary to *Aspergillus*. *American journal of otolaryngology*. 1997 Jan 1;18(1):19-22
3. Shelton JC, Antonelli PJ, Hackett R. Skull base fungal osteomyelitis in an immunocompetent host. *Otolaryngology—Head and Neck Surgery*. 2002 Jan;126(1):76-8
4. Stodulski D, Kowalska B, Stankiewicz C. Otogenic skull base osteomyelitis caused by invasive fungal infection: case report and literature review. *European Archives of Oto-Rhino-Laryngology and Head & Neck*. 2006 Dec;263:1070-6
5. Blyth CC, Gomes L, Sorrell TC, Da Cruz M, Sud A, Chen SA. Skull-base osteomyelitis: fungal vs. bacterial infection. *Clinical Microbiology and Infection*. 2011 Feb 1;17(2):306-11
6. Magliulo G, Varacalli S, Ciofalo A. Osteomyelitis of the skull base with atypical onset and evolution. *Annals of Otolaryngology & Laryngology*. 2000 Mar;109(3):326-30
7. Mani R, Belcadhi M, Krifa N, Abdelkefi M, Bouzouita K. Fungal necrotizing external otitis. In *Annales D'oto-laryngologie et de Chirurgie Cervico Faciale: Bulletin de la Societe D'otolaryngologie des Hopitaux de Paris* 2008 Feb 29 (Vol. 125, No. 1, pp. 40-45)
8. Chan LL, Singh S, Jones D, Diaz Jr EM, Ginsberg LE. Imaging of mucormycosis skull base osteomyelitis. *American journal of neuroradiology*. 2000 May 1;21(5):828-31
9. Rinaldi MG. Invasive aspergillosis. *Reviews of infectious diseases*. 1983 Nov 1;5(6):1061-77
10. Chaudhary HA, Ibrahim WH, Yousaf Z, Abubeker IY, Kartha A. Fungal malignant otitis externa involves a cascade of complications culminating in pseudoaneurysm of internal maxillary artery: a case report. *The American journal of case reports*. 2019 Apr 21;20:562
11. Hamzany Y, Soudry E, Preis M, Hadar T, Hilly O, Bishara J, Nageris BI. Fungal malignant external otitis. *Journal of Infection*. 2011 Mar 1;62(3):226-31
12. Hariri OR, Minasian T, Quadri SA, Dyurgerova A, Farr S, Miulli DE, Siddiqi J. Histoplasmosis with deep CNS involvement: case presentation with discussion and literature review. *Journal of Neurological Surgery Reports*. 2015 Jul;76(01):e167-72
13. Prasad SC, Prasad KC, Kumar A, Thada ND, Rao P, Chalasani S. Osteomyelitis of the temporal bone: terminology, diagnosis, and management. *Journal of Neurological Surgery Part B: Skull Base*. 2014 Oct;75(05):324-31
14. Grandis JR, Branstetter BF, Victor LY. The changing face of malignant (necrotizing) external otitis: clinical, radiological, and anatomic correlations. *The Lancet infectious diseases*. 2004 Jan 1;4(1):34-9.

# Malignant Mucosal Melanoma of the Maxillary Sinus with an Oro-antral Fistula

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## ABSTRACT

### Introduction

Sinonasal mucosal melanomas are uncommon, making up merely 0.5-2% of all malignant melanomas and 4% of melanomas in head and neck region. In the sinonasal region, they are very aggressive, commonly presenting at an advanced stage. Diagnosis is made using histopathological examination and immunohistochemistry by S100 and HMB-45 markers.

### Case Report

We describe a case of 62 year-old female with swelling in the maxillary area and an oroantral fistula at the right maxillary alveolus who underwent right endoscopic sinus surgery with septoplasty with partial medial maxillectomy and oroantral fistula closure which was diagnosed as malignant melanoma on histopathology and immunohistochemistry.

### Discussion

Malignant mucosal melanoma is a rare but aggressive disease originating from melanocytes located in the mucosa. It is characterised by swift nonspecific symptom progression and early metastasis. When the tumour is detected early and fully excised, malignant melanomas are mostly curable. However, once metastasis occurs, treatment options are limited.

### Keywords

Malignant Melanoma; Sinonasal Melanoma; Sinonasal Malignancy; Oro-Antral Fistula

**S**inonasal mucosal melanomas are particularly aggressive, frequently appearing at an advanced stage, and have a 5-year survival rate of 20-30%.<sup>3</sup> Nasal obstruction, epistaxis and swelling are the commonly presenting complaints, although they tend to be nonspecific and hence can delay diagnosis.<sup>1,4</sup> Diagnosis is made using histopathological examination and immunohistochemistry by S100 and HMB-45 markers.<sup>2</sup>

When the tumour is discovered early and fully excised, melanoma is highly curable. However, once metastasis occurs, treatment options are limited, and palliative care becomes the primary treatment modality.<sup>3</sup>

## Case Report

A 62 yr female visited our outpatient clinic, reporting dull pain and swelling in the right maxillary region that had

persisted for one month. She also complained of swelling involving her right 2<sup>nd</sup> upper molar tooth. We examined her to find an exophytic growth at right maxillary alveolus involving the gingival mucosa and right 2<sup>nd</sup> upper molar tooth with an oro-antral fistula (Fig. 1). The examination by touch revealed a wound that felt firm and had a smooth surface. The mass was non-tender and did not bleed on touch. Cervical neck nodes were not palpable. The diagnostic nasal endoscopy revealed a deviated nasal septum towards right, with a greyish mass partially occluding the right nasal cavity.

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**Fig. 1. Growth seen at right maxillary alveolus with oro-antral fistula on initial visit**

Computed tomography of the paranasal sinuses showed heterogeneously enhancing soft tissue lesion with destruction of medial wall of right maxilla, suggestive of right maxillary sinus malignancy or infected papilloma with bony erosions with extension of mass into right nasal cavity (Fig. 2).



**Fig. 2. Coronal computed tomography revealed a soft tissue lesion the right maxillary sinus extending into right nasal cavity with bony erosions.**

The clinical presentation looked like a benign inflammatory mass, so the decision was taken to go ahead for surgery rather than taking nasal or oral biopsy. The

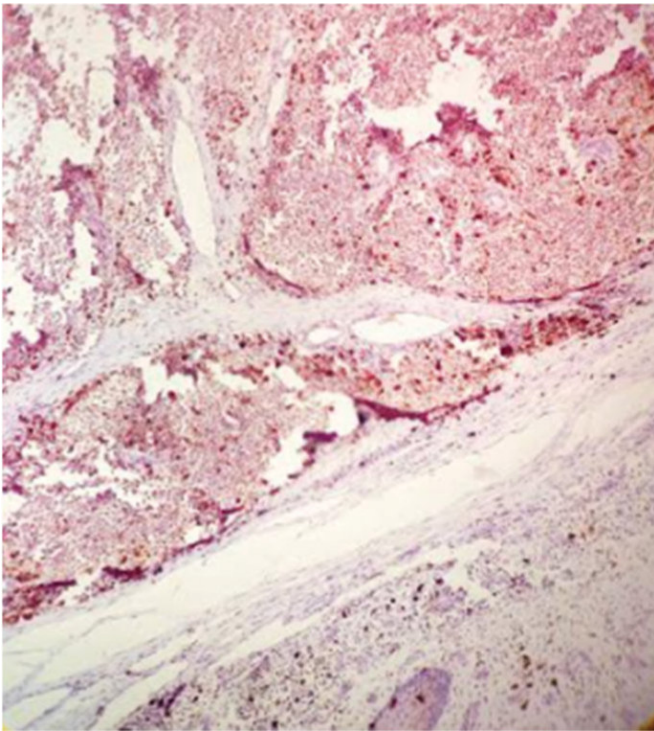
patient underwent a right-sided full house functional endoscopic sinus surgery (with opening up of all natural ostia of the sinuses) with septoplasty (to get a better approach to the right nasal cavity). Complete clearance of nasal and maxillary mass was done endoscopically along with partial medial maxillectomy to remove the eroded bony parts. All the diseased tissue in the maxilla and oral lesion including the bony erosions was excised with the help of microdebrider in certain areas, so margins could not be obtained and the patient was referred to radiation oncology for adjuvant radiotherapy. In the oral cavity, the oral maxillofacial surgeon performed complete excision of the overhanging mass with clearance of the disease along with 2<sup>nd</sup> upper molar tooth, gingival mucosa and bony erosions, and primary closure of the oroantral fistula was done using a buccal fat pad and buccal mucosa (Fig. 3). Hard palate was not involved in our patient.



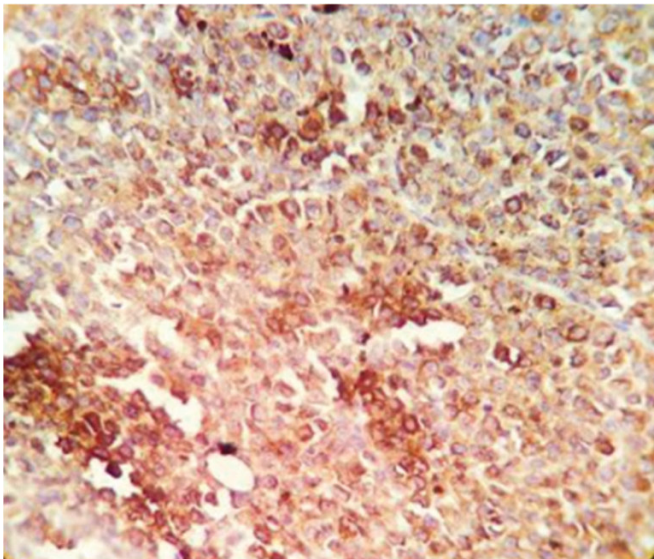
**Fig. 3. Excising the growth at right maxillary alveolus and repairing the oro-antral fistula**

In histopathological examination a tumour composed of round to oval cells, arranged in sheets and pseudo alveolar pattern with intracytoplasmic and extracellular brownish pigment – melanin - was seen. Thus, a diagnosis of malignant melanoma of right maxillary sinus extending orally as a gingival lesion was made which was later confirmed on immunohistochemistry by the presence of S100 (Fig. 4) and HMB45 (Fig. 5) markers.

Further, the patient was referred to radiation oncology, where she underwent adjuvant radiotherapy with 30 cycles of 60Gy over 6 weeks. She has been disease-free for the last 6 months and is under close follow up.



**Fig. 4. On Immunohistochemical staining, S100 positivity seen under 4 x 10x magnification**



**Fig. 5. On Immunohistochemical staining, HMB45 positivity seen under 4 x 40x magnification**

## Discussion

Mucosal melanomas in the head and neck region are infrequent, typically occurring in individuals in their 60s and 70s. Compared to their cutaneous and uveal counterparts, mucosal melanomas often present at a later stage and exhibit more aggressive behaviour, leading to swift symptom progression and early metastasis.

Regardless of pigmentation, intranasal masses that exhibit rapid growth and occult malignancy characteristics should always be looked into in the context of melanoma.<sup>3</sup> Neoplasms confined to the paranasal sinuses have a tendency to remain asymptomatic until they start invading surrounding structures. As a result, the poor prognoses stems from late detection and their proximity to crucial structures like the brain, skull base, orbits, and carotid artery.<sup>5</sup> Tumours extending beyond the roof of the maxillary sinus may penetrate the eye or the posterior wall, accessing nerves and blood vessels at the skull base and the pterygomaxillary space, potentially leading to a direct invasion of the brain.<sup>5</sup> Early detection of these malignancies is crucial to prevent such complications.

The diagnostic evaluation entails a comprehensive physical examination of the head and neck which includes assessing facial asymmetry, evaluating extraocular muscles, observing pupillary response and looking for signs of globe displacement.

The nasal exam includes flexible or rigid diagnostic nasal endoscopy. Both computed tomography and magnetic resonance imaging can be used to further categorize sinonasal malignancies.<sup>5</sup> Diagnosis is based on histopathological examination and Immunohistochemistry. The detection of anti-S100 antibodies is very sensitive but not specific while anti-HMB45 antibodies are highly specific and somewhat sensitive. When staining the two markers yield uncertain results; Melan A, a melanoma-specific marker, is normally used, as it has proved to be extremely specific in distinguishing melanoma from other cancers.

Malignant mucosal melanomas are classified based on their primary anatomical locations, differentiating between cancers of the maxillary sinus, nasal cavity or

ethmoid sinuses. The TNM framework does not provide a standardised staging system for paranasal sinus melanoma. The majority of clinicians divide it into three stages. Stage I is localized tumour, stage II is local tumour with lymph node metastases, and stage III is distant metastasis.<sup>5</sup> Malignant melanoma in the sinuses is treated on a case-to-case basis depending on location and extent.

When there are no distant metastases, the goal is usually to completely resect the tumour. However, due to the proximity of vital structures like the eyes and brain, it is difficult to secure positive margins free of disease in affected sites. Numerous recent studies indicate that radiation therapy may be beneficial following the surgical removal of mucosal melanoma. So even if these tumours have historically been considered resistant to radiation, complete excision of tumour and radiation therapy postoperatively is the current accepted protocol for resectable lesions.<sup>6,7</sup> In recent years, immunotherapy and targeted therapies have been upcoming treatment modalities that have improved the survival rates and outcomes in patients. At more advanced stages, chemotherapy—often including actinomycin D, interferon, and cisplatin—is generally used, primarily for palliative care or when surgical options are not feasible.<sup>2</sup>

These patients require regular follow-ups including radiological evaluations every year to exclude metastasis. In the cases where tumours have unresectable margins or brain involvement, carotid artery encasement, or bilateral optic nerve involvement, the preferred treatment option is palliative care.<sup>5,6,8</sup>

## Conclusion

Malignant melanoma is a rare cancer arising from melanocytes in the later stages of life. These tumors are often missed due to late appearance of nonspecific

symptoms. Histopathology and immunohistochemistry provide the definitive diagnosis. These patients require timely follow-ups. Through this case we learn that even in the absence of specific symptoms, timely detection of intranasal and oral lesions can help to improve prognosis of sinonasal malignant mucosal melanomas.

## References

1. Devi, S., Sinha, R., & Singh, R. K. (2015). Malignant melanoma maxilla. *National journal of maxillofacial surgery*, 6(1), 115–118
2. S. S. Alves, L. G. S. Berriel, R. T. Alves, M. B. Pinto, C. F. P. Oliveira, A. C. Cazzotto, W. V. Moura, “Sinonasal Melanoma: A Case Report and Literature Review”, *Case Reports in Oncological Medicine*, vol. 2017, Article ID 8201301, 6 pages, 2017
3. Gautam, K., Tiwari, S. B., Shrestha, S., Gaire, P., Dulal, M., Shrestha, B. M., Dhital, R., Manandhar, U., & Baral, A. K. (2022). Sinonasal mucosal melanoma presenting as a maxillary sinus mass: A case report. *Clinical case reports*, 10(2), e05374
4. GUPTA S, SINGH P, MISRA V, JAIN S. MALIGNANT MELANOMA OF MAXILLARY SINUS: A RARE ENTITY. *Journal of Clinical and Diagnostic Research [serial online]* 2009 October [cited: 2009 October 5]; 3:1801-1804
5. Gasparyan, A., Amiri, F., Safdieh, J., Reid, V., Cirincione, E., & Shah, D. (2011). Malignant mucosal melanoma of the paranasal sinuses: Two case presentations. *World journal of clinical oncology*, 2(10), 344–347
6. Hung Dinh Kieu, Tam Duc Le, Vu Nguyen, Trung Quang Tran, Malignant mucosal melanoma of paranasal sinuses: A case report, *International Journal of Surgery Case Reports*, Volume 87, 2021, 106450, ISSN 2210-2612
7. Popoviæ D, Milisavljeviæ D. Malignant tumours of the maxillary sinus: A ten-year experience. *Med Biol*. 2004;11:31–34
8. Kukde, M. M., Madurwar, A. U., Selokar, D. S., & Noman, O. (2023). A Case Report of Oral Malignant Melanoma: A Silent Killer. *Cureus*, 15(3), e36671. <https://doi.org/10.7759/cureus.36671>.

# Parotid Lymphangioma: A Rare Diagnostic Puzzle in Head and Neck Pathology

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## ABSTRACT

### Introduction

Lymphangioma is a rare, benign lymphatic malformation, most commonly seen in children and infrequently involving the parotid gland in adults. Its presentation often mimics other parotid masses, posing a diagnostic challenge. Diagnosis is typically based on clinical examination, imaging, and confirmed by histopathology.

### Case Report

A patient presented with a congenital swelling on the left side of the neck. Clinical examination revealed a soft, lobulated, mobile, non-tender mass measuring approximately 5 × 5 cm in the infra-auricular region extending to the mandibular area. Fine-needle aspiration cytology (FNAC) suggested a benign cystic lesion. Surgical excision was performed via a modified Blair incision under general anesthesia. The mass was sent for histopathological examination, which confirmed lymphangioma. The postoperative period was uneventful, and the patient was discharged in stable condition.

### Discussion

Though rare, parotid lymphangioma should be considered in the differential diagnosis of parotid region masses in adults. A combination of clinical assessment, imaging, and histopathological evaluation is essential for accurate diagnosis and appropriate management.

### Keywords

Lymphangioma; Parotid Neoplasms; Salivary Gland Neoplasms; Head and Neck Neoplasms

Lymphangiomas are benign, congenital malformations of the lymphatic system, typically occurring in early childhood.<sup>1</sup> The incidence among children is 1.2–2.8 per 100,000.<sup>2</sup>

These lesions are rare in adults, particularly when located in the parotid gland, which is an uncommon site for lymphangiomas. Parotid lymphangiomas often present as cystic masses that can cause facial swelling or asymmetry.

Lymphangiomas are categorized into three types: capillary, cavernous, and cystic. The latter has the potential to infiltrate the surrounding tissue leading to a problematic surgical removal.<sup>3</sup>

## Case Report

A 17 year-old male patient presented to our OPD with a history of swelling in left parotid region since birth. The

swelling was insidious in onset, non- progressive and painless. There was no dysphagia or respiratory distress. Patient did not have any comorbidities.

Examination – On inspection a soft, bosselated mass seen in left parotid region ~ 5cm × 5 cm in size (Fig. 1).

On palpation, mass was multilobulated, soft, non-tender & mobile with well-defined borders. Skin over the mass was mobile .

Origin of the mass could not be ascertained on history and clinical examinations.

USG neck showed cystic lesion with fine homogenous echoes in left upper cervical region (Lymphangioma / low flow venous malformation).

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**Fig. 1. Pre operative image showing a soft, multilobulated swelling in parotid region**

MRI face and neck sections revealed a thin walled lobulated multiloculated cystic lesion involving posterior inferior part of superficial and deep lobes of left parotid gland showing slight intra parotid extension inferiorly in adjacent superficial inter facial planes-likely benign (lymphoepithelial cyst/lymphangioma) (Fig. 2.1, 2.2).

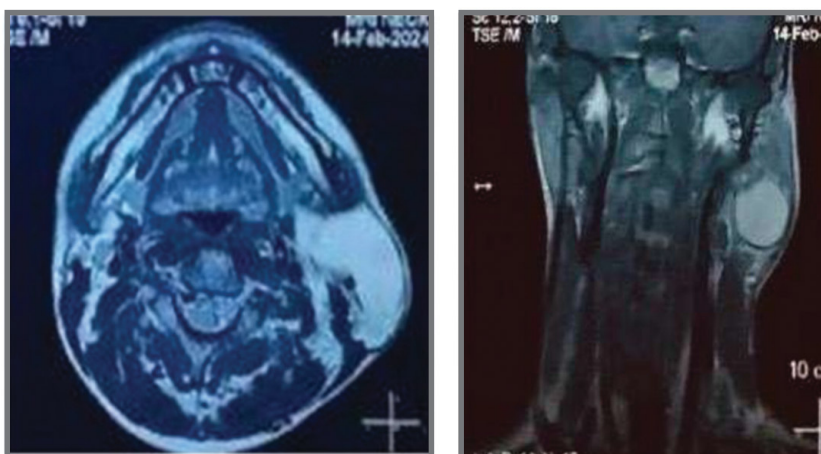
FNAC was suggestive of benign cystic lesion.

A provisional diagnosis of Lymphangioma of left parotid gland was made and surgical excision planned. We further planned a surgical procedure for excision of the lymphangioma.

An informed consent was obtained and the patient was taken under general anaesthesia. Under all aseptic precautions, the usual painting and draping was carried out and incision line was marked. A modified Blair's incision was taken in preauricular and cervical skin crease, superficial cervicofacial flap was raised, anterior border of sternocleidomastoid identified followed by exposure of posterior belly of digastric. The cyst was enveloped around internal carotid artery and jugular vein. Cyst was excised by finger and blunt dissection after removal from surrounding structures. (Figs. 3.1, 3.2).

Gross section revealed grayish white pale yellow soft tissue piece measuring 10\*4\*2 cm. Histopathology revealed large dilated cystic areas lined with flattened epithelium with intervening fibro collagenous tissue displaying numerous cluster of lymphoid tissue along with lymphoid aggregates. Parotid serous acini are seen at places adjacent to these dilated lymphoid spaces. (Fig. 4.1, 4.2).

Thus, a definitive diagnosis of Lymphangioma of left parotid gland was made. Intra-operative and post-operative periods were uneventful and no recurrence was seen (Fig 5).



**Fig. 2.1, 2.2. MRI section ,axial and coronal view showing a lobulated swelling in parotid region involving superficial and deep lobe with slight inferior extension to adjacent superficial inter facial plane**

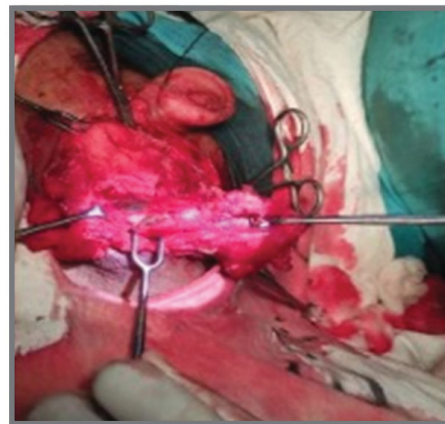


Fig. 3.1, 3.2. Intraoperative image showing excision of swelling

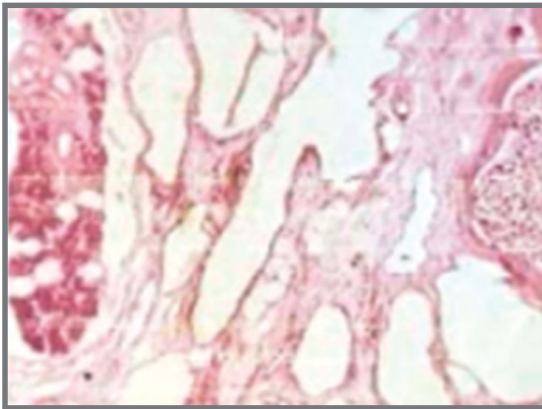


Fig. 4.1. Histopathology image showing large caliber lymph vascular spaces

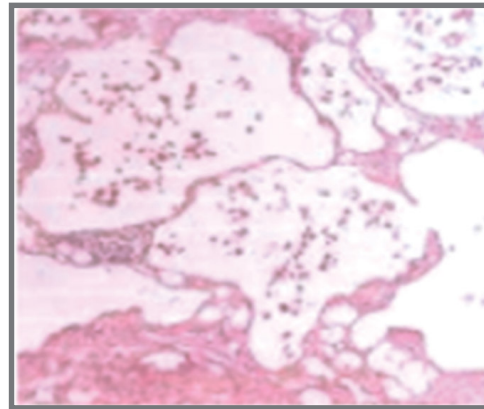


Fig. 4.2. Histopathology showing cluster of lymphoid aggregates



Fig. 5. Post operative scar at 1 year of follow up

### Discussion

The origin of lymphangiomas remains controversial. Theories include lymphangiomas as true neoplasms, hamartomas, or congenital dysplasias of the lymphatics. Sidle et al. conducted a study in 2005 using immunohistochemistry to assess the expression of the angiogenic inducer vascular endothelial growth factor (VEGF) and the angiogenic inhibitor pigment epithelium-derived factor (PEDF).<sup>4</sup> They conclude that lymphangiomas exhibit tumor-like pathogenesis due to the high expression of angiogenic inducers compared with the low expression of inhibitors. However, most physicians favor the theory that dysplastic lymphatic tissue has been sequestered in a target tissue space or organ during fetal development. The majority of lymphangiomas arise from

parts of lymphatic sacs that fail to establish connections. Acquired lymphangiomas usually develop after surgery, trauma, infection, or chronic infection.

On the basis of microscopic characteristics, three types of lymphangiomas are described: capillary, cavernous, and cystic. Capillary lymphangioma consists of small, capillary-sized lymphatic vessels. Cavernous lymphangioma comprises dilated lymphatic channels. Cystic lymphangioma is a large, macrocystic lymphangioma filled with straw-colored, protein-rich fluid. Cystic types have the potential for extensive infiltration of surrounding tissues and lead to surgical difficulties. Cystic lymphangiomas are also classified into microcystic, macrocystic, and mixed subtypes, according to the size of their cysts.<sup>5</sup>

Lymphangiomas, being congenital lesions, are rare in adults, and primary involvement of the parotid gland remains an uncommon occurrence. The differential diagnosis of a cystic parotid mass includes Warthin's tumor, benign lymphoepithelial lesions, branchial cleft cysts, chronic sialadenitis, cystic pleomorphic adenoma, and cystic low-grade mucoepidermoid carcinoma.<sup>6</sup>

On ultrasonography (USG), parotid lymphangioma appears as fine homogeneous echoes in the left upper cervical region. The differential for cystic lesions in the parotid includes Warthin's tumor, sialocele, first branchial cleft cyst, lymphoepithelial cyst, necrotic lymph nodes, and infected lymph nodes.

MRI of the face and neck reveals a thin-walled lobulated multiloculated cystic lesion involving the posterior inferior part of the superficial and deep lobes of the left parotid gland, showing slight intra-parotid extension inferiorly into adjacent superficial interfascial planes—likely benign (lymphoepithelial cyst/lymphangioma). Fine needle aspiration cytology (FNAC) aspirates are suggestive of a benign cystic lesion.

The definitive diagnosis is made on postoperative histopathology, which reveals large dilated cystic areas

lined with flattened epithelium with intervening fibro-collagenous tissue displaying numerous clusters of lymphoid tissue along with lymphoid aggregates. Parotid serous acini are seen at places adjacent to these dilated lymphoid spaces.

Primary management is surgical, which includes enucleation, superficial, or total parotidectomy. Medical therapy in the form of sclerotherapy can be given in cases where surgery is difficult or the lesion is infiltrative. Conservative management with observation is rarely followed. Decompression of the cyst with aspiration is temporary. However, in our case, we plan a surgical procedure for excision of the lymphangioma via a modified Blair's incision.

## Conclusion

Lymphangiomas of the parotid gland in adults are rare, and their presentation can pose diagnostic challenges due to their similarity with other cystic lesions. In this case, a 17-year-old male presented with a congenital, non-progressive swelling in the parotid region, which was ultimately diagnosed through imaging as a cystic lymphangioma. Surgical excision remains the mainstay of treatment, with complete resection offering both diagnostic confirmation and therapeutic relief. Early recognition and proper imaging are crucial in guiding management and achieving favorable outcomes, particularly in rare anatomical locations such as the parotid gland.

## References

1. Kennedy TL, Whitaker M, Pellitteri P, Wood WE. Cystic hygroma/lymphangioma: a rational approach to management. *Laryngoscope*. 2001 Nov;111(11 Pt 1):1929–37
2. Colangeli W, Facchini V, Kapitonov A, Zappalà M, Bozza F, Becelli R. Cystic lymphangioma in adult: a case report and a review of the literature. *J Surg Case Rep*. 2020 Jul 31;2020(7):rjaa179
3. Sidle DM, Maddalozzo J, Meier JD, Cornwell M, Stellmach V,

- Crawford SE. Altered pigment epithelium-derived factor and vascular endothelial growth factor levels in lymphangioma pathogenesis and clinical recurrence. *Arch Otolaryngol Head Neck Surg.* 2005 Nov;131(11):990–5
4. Giguère CM, Bauman NM, Smith RJ. New treatment options for lymphangioma in infants and children. *Ann Otol Rhinol Laryngol.* 2002 Dec;111(12 Pt 1):1066–75
  5. Henke AC, Cooley ML, Hughes JH, Timmerman TG. Fine-needle aspiration cytology of lymphangioma of the parotid gland in an adult. *Diagn Cytopathol.* 2001 Feb;24(2):126–8
  6. Shin JH, Lee HK, Kim SY, Choi CG, Suh DC. Imaging of parapharyngeal space lesions: focus on the prestyloid compartment. *AJR Am J Roentgenol.* 2001 Dec;177(6):1465–70.

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