



CLINICAL, RADIOLOGICAL, AND PATHOLOGICAL SPECTRUM OF SINONASAL MASSES

Otorhinolaryngology

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ABSTRACT

Background: Sinonasal masses (SNMs) represent a diverse group of conditions that frequently present in ENT outpatient departments. These include non-neoplastic lesions such as inflammatory polyps and congenital anomalies, as well as benign and malignant neoplasms. Accurate diagnosis requires an integrated approach involving clinical evaluation, radiological imaging, and histopathological analysis. This study aims to evaluate the clinical, radiological, and pathological spectrum of sinonasal masses to enhance diagnostic accuracy and inform treatment strategies.

Methods: This prospective observational study was conducted on 82 patients presenting with sinonasal masses at a tertiary care hospital over one year. Clinical examination included a detailed history, physical assessment, and diagnostic nasal endoscopy. Radiological evaluations were performed using computed tomography (CT) and magnetic resonance imaging (MRI). Histopathological analysis involved incision or excision biopsies processed using standard staining techniques. Data were analyzed to correlate clinical findings with imaging and histopathological results.

Results: Sinonasal masses predominantly affected younger individuals, with 39.02% of patients aged 1–20 years. A slight male predominance (54.88%) was observed. Nasal obstruction (92.68%) and discharge (88%) were the most common symptoms. Radiologically, mucosal thickening was the predominant finding, noted in 54.88% of cases on the left side. Histopathological examination revealed inflammatory sinonasal polyps as the most common diagnosis (47.56%), followed by benign neoplasms (24.39%). A strong concordance (97.92%) was observed in inflammatory cases across clinical, radiological, and histopathological evaluations. **Conclusions:** Sinonasal masses exhibit a complex clinical, radiological, and pathological spectrum, with inflammatory lesions being the most common. An integrated diagnostic approach is essential for accurate evaluation and effective management of these conditions.

KEYWORDS

Sinonasal masses, inflammatory polyps, radiological imaging, histopathology, nasal obstruction.

INTRODUCTION

Sinonasal masses (SNMs) encompass a broad spectrum of conditions commonly encountered in Ear, Nose, and Throat (ENT) outpatient departments. [1] These masses include non-neoplastic conditions such as inflammatory polyps and congenital anomalies, as well as benign and malignant neoplasms. Their clinical presentation often varies based on the type, severity, and extent of the underlying disease. Symptoms such as nasal obstruction, discharge, epistaxis, and altered sense of smell are frequently reported, making SNMs a significant cause of morbidity across all age groups. [2,3]

Nasal polyps, one of the most prevalent non-neoplastic conditions, affect around 4% of the adult population and are a leading cause of nasal blockage. [4] Despite being recognized since ancient times, their exact pathophysiology remains poorly understood, and treatment options have seen limited innovation over the years. Congenital masses, including dermoids, gliomas, and encephaloceles, present unique diagnostic challenges due to their midline location and varied presentation. [5]

Accurate diagnosis of SNMs relies heavily on advanced imaging techniques and histopathological analysis. Computed tomography (CT) is instrumental in evaluating bone involvement and the extent of disease, while magnetic resonance imaging (MRI) provides superior visualization of soft tissues, helping to differentiate between benign and malignant lesions. However, these imaging modalities have limitations, particularly in detecting early-stage polyps or certain infections, emphasizing the necessity of histopathological confirmation. Histopathology not only offers a definitive diagnosis but also helps in understanding tissue architecture, cellular morphology, and immunohistochemical characteristics, guiding tailored treatment plans. [6,7]

This study aims to explore the clinical, radiological, and pathological spectrum of sinonasal masses, focusing on cases from a tertiary care hospital. By correlating clinical findings with imaging and histopathological results, the research seeks to improve diagnostic accuracy and inform better treatment strategies. This integrated approach is essential for addressing the diagnostic challenges posed by SNMs and enhancing surgical outcomes.

MATERIAL AND METHODS

This prospective observational study was conducted in the Department of Otolaryngology at BRD Medical College, Gorakhpur, from April 2023 to March 2024. A total of 82 patients presenting with sinonasal masses were included. The study was designed to evaluate the clinical, radiological, and pathological spectrum of sinonasal masses. Ethical clearance was obtained from the Institutional Ethics Committee, and informed consent was secured from all participants prior to their inclusion.

Study Design

- **Type of Study:** Prospective observational study.
- **Sample Size Calculation:** Determined using the formula $n = Z^2pq/d^2$, resulting in a sample size of 82 patients.
- **Study Duration:** One year, divided into phases:
- **July–August 2023:** Literature review.
- **September 2023–February 2024:** Data collection.
- **March–April 2024:** Data analysis.
- **May–June 2024:** Thesis writing and submission.

Inclusion and Exclusion Criteria

- **Inclusion Criteria:**
- Patients of all age groups and genders presenting with masses in

the nasal cavity or paranasal sinuses.

- **Exclusion Criteria:**
- Traumatic cases.
- Patients refusing consent.

Data Collection And Procedure

Patients attending the outpatient department with complaints of nasal masses, nasal blockage, or discharge were thoroughly examined. Eligible patients were admitted to the ward, and detailed histories were obtained, focusing on demographics, clinical symptoms, family history, and any history of allergies or addiction.

Each patient underwent a comprehensive clinical examination of the nose and paranasal sinuses, along with routine hematological and relevant radiological investigations (X-ray, CT, or MRI) as needed. Diagnostic nasal endoscopy was performed where indicated. For histopathological confirmation, incisional or excisional biopsies were conducted under informed consent, and tissue samples were processed in 10% formalin for analysis.

Histopathological Processing

Tissue specimens were fixed, dehydrated, cleared, infiltrated, and embedded. Sections of 4–5 µm thickness were cut and stained with hematoxylin and eosin (H&E). Special stains such as PAS, reticulin, von Giesen, and Masson's trichrome were applied when necessary.

Data Analysis

The data were tabulated and analyzed using Microsoft Excel. Key factors such as age, sex, clinical findings, radiological features, and histopathological results were evaluated to identify patterns and correlations.

Ethical Considerations

Ethical approval was obtained, and the study adhered to strict confidentiality protocols. Written informed consent was obtained from all participants.

RESULTS

Table 1 provides the demographic distribution of patients with sinonasal masses. The majority of patients (39.02%) are aged 01–20 years, while males (54.88%) slightly outnumber females (45.12%).

Age (years)	N	%
01-20 years	32	39.02
21-40 years	25	30.49
41-60 years	18	21.95
61-80 years	7	8.54
Gender		
Male	45	54.88
Female	37	45.12



Table 2 represents the clinical and examination findings in patients with sinonasal masses. The most common symptom was nasal obstruction (92.68%), followed by loss of smell (37.80%), and extension to the nasopharynx (53.66%). Other features, such as septal deviation (48.78%) and cheek/facial swelling (21.95%), were also noted. Examination revealed a predominance of soft masses (71.95%) with pale appearance (57.32%).

		N	%
Nasal obstruction	Yes	76	92.68
	No	6	7.32
Cheek/ Facial Swelling	Yes	18	21.95
	No	64	78.05

Epistaxis	Yes	21	25.61
	No	61	74.39
Vision loss/ double vision	Yes	4	4.88
	No	78	95.12
Proptosis	Yes	6	7.32
	No	76	92.68
Headache	Yes	24	34.14
	No	58	70.73
Palate Involvement/ Loosening Teeth	Yes	11	13.41
	No	71	86.59
Hearing Lose	Yes	15	18.29
	No	67	81.71
Change In Voice	Yes	30	36.59
	No	52	63.41
Loss of Smell	Yes	31	37.80
	No	51	62.20
Duration	≤3 month	24	34.14
	>3 month	58	70.73
Bleed on Touch	Yes	25	30.49
	No	57	69.51
Septal Deviation	Yes	40	48.78
	No	42	51.22
Turbinate Hypertrophy	Yes	20	24.39
	No	62	75.61
Extension To Nasopharynx	Yes	44	53.66
	No	38	46.34
Consistency	Soft	59	71.95
	Firm	16	19.51
	Hard	4	4.88
	Firm To Hard	3	3.66
Colour	Pale	47	57.32
	Reddish Gray	19	23.17
	Reddish Pink	14	17.07
	Yellowish Pink	2	2.44
Fixity	Yes	22	26.83
	No	60	73.17

Table 3 represents the CT scan findings of sinus involvement in patients with sinonasal masses. Mucosal thickening was most frequently observed in the maxillary sinus (54.88% on the left and 52.44% on the right), followed by the ethmoid sinus (51.22% on the left and 41.46% on the right). Frontal and sphenoid sinuses showed lower involvement, with mucosal thickening noted in fewer than 20% of cases.

CT scan		Yes		No	
		n	%	n	%
Sinus RT	M	43	52.44	39	47.56
	E	34	41.46	48	58.54
	F	13	15.85	69	84.15
	S	11	13.41	71	86.59
Sinus LT	M	45	54.88	37	45.12
	E	42	51.22	40	48.78
	F	15	18.29	67	81.71
	S	13	15.85	69	84.15

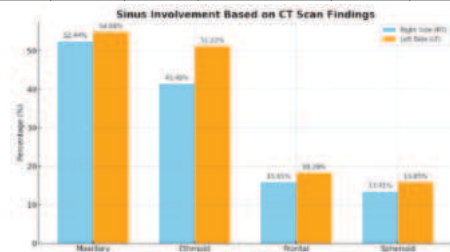


Table 4 represents the histopathological spectrum of sinonasal masses. Inflammatory sinonasal polyps were the most common diagnosis (47.56%), followed by benign neoplastic lesions (24.39%) and fungal/allergic conditions (10.98%). Malignant neoplastic lesions constituted 9.76% of the cases, with other rare lesions accounting for 7.31%.

	n	%
Inflammatory Sinonasal Polyp	39	47.56
Fungal Rhinosinusitis	8	9.76

Nasopharyngeal Angiofibroma	7	8.54
Allergic Fungal Sinusitis	1	1.22
Benign Vascular Lesion	1	1.22
Capillary Hemangioma	3	3.66
Dermoid Cyst	1	1.22
Giant Cell Reparative Granuloma	1	1.22
Cavernous Hemangioma	1	1.22
Inverted Papilloma	3	3.66
Rhinolith	3	3.66
Lobular Capillary Hemangioma	1	1.22
Nasal Papilloma	1	1.22
Nasal Papilloma Oncocytic Type	1	1.22
Nasolabial Cyst	2	2.43
Nasopharyngeal Carcinoma	2	2.43
Osteosarcoma	1	1.22
Osteomyelitis	2	2.43
Round cell tu with poorly diffifferent SCC	1	1.22
sinonasal papilloma with atypical	1	1.22
Small round cell tumor	1	1.22
well differentiate SCC	1	1.22

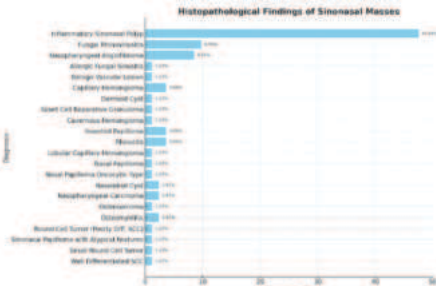


Table 5 outlines the correlation between clinical, radiological, and histopathological findings in sinonasal masses. Inflammatory lesions show a high degree of concordance across all modalities (97.92%). Benign and malignant findings demonstrate significant alignment, with benign lesions comprising 85.71% of cases in both radiological and histopathological evaluations. Other rare categories exhibit notable variability.

Clinical Findings		Radiological Findings		Histopathological Findings	
		N	%	n	%
Inflammatory (n=48)	Inflammatory	47	97.92	47	97.92
	Benign	1	2.08	0	0.00
	Malignant	0	0.00	0	0.00
	Other	0	0.00	1	2.08
Benign (n=21)	Inflammatory	2	9.52	1	4.76
	Benign	18	85.71	18	85.71
	Malignant	1	4.76	2	9.52
	Other	0	0.00	0	0.00
Malignant (n=10)	Inflammatory	1	10.00	0	0.00
	Benign	3	30.00	4	40.00
	Malignant	6	60.00	6	60.00
	Other	0	0.00	0	0.00
Other (n=3)	Inflammatory	0	0.00	0	0.00
	Benign	0	0.00	0	0.00
	Malignant	0	0.00	0	0.00
	Other	3	100.00	3	30.00

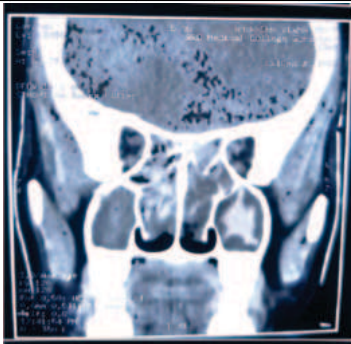


Figure 1- CECT PNS showing B/L fungal rhinosinusitis with polyp

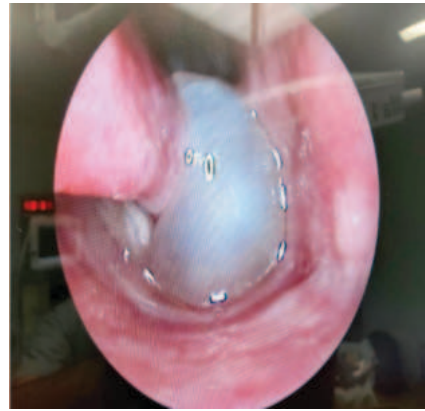


Figure 2- Diagnostic nasal endoscopic findings showing RT side antrochoanal polyp



Figure 3- Diagnostic endoscopy showing JNA



Figure 4 - Hard palate and Teeth involvement by fungal invasion



Figure 5 CT scan showing Invasive fungal sinusitis

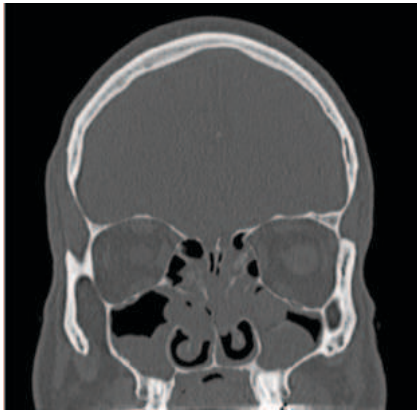


Figure 6 CECT showing bilateral nasal polyposis

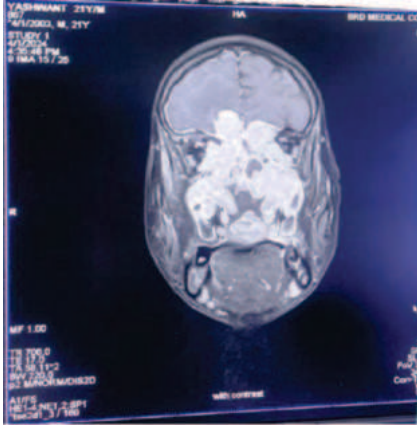


Figure 7- Gadolinium enhanced contrasts MRI showing Nasopharyngeal carcinoma with intracranial extension



Figure 8- CT scan showing sun ray appearance of maxillary sinus wall

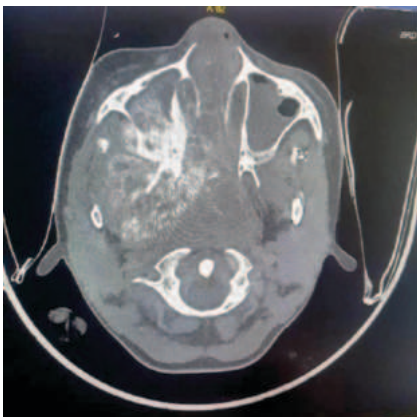


Figure 9- CT scan of axial section showing osteosarcoma of the maxillary sinus wall

DISCUSSION

This study, titled “Clinical, Radiological, and Pathological Spectrum of Sinonasal Masses,” explores the intricate features of sinonasal masses, including demographic, clinical, radiological, and histopathological findings. The results align with existing literature and provide further insights into the characteristics and diagnostic challenges of sinonasal masses.

Our study found that the majority of cases were in younger age groups, with 39.02% in the 1–20 years range and 30.49% in the 21–40 years range. This contrasts with **Sahoo et al. (2023) [9]**, who reported a predominant age group of 50–70 years with a mean age of 45.5 years, suggesting possible geographic or demographic differences. **Dongapure et al. (2023) [10]** similarly observed sinonasal masses primarily in the second and third decades of life, with malignant lesions more common in the fourth and fifth decades. The male preponderance in our study (54.88%) is consistent with the findings of **Sahoo et al. (2023) [9]**, **Dongapure et al. (2023) [10]**, and **Bhalodiya et al. (2020) [11]**, who reported male-to-female ratios of 1.25:1, 1.7:1, and 1.5:1, respectively. This male dominance may be due to occupational and environmental exposures.

Nasal obstruction was the most common symptom in our study (92.68%), followed by nasal discharge (88%) and anosmia (37.80%). These findings are consistent with **Sahoo et al. (2023)[9]**, who reported nasal obstruction in 90% and nasal discharge in 74% of patients. **Dongapure et al. (2023) [10]** and **Bhalodiya et al. (2020) [11]** also noted similar patterns. More severe symptoms, such as proptosis (7.32%) and visual disturbances (4.88%), were linked to advanced disease, consistent with **Sharma et al. (2012) [13]** and **Maheshwari et al. (2017)[12]**, who reported eye-related symptoms in 9% and 5% of cases, respectively.

Radiological examinations, particularly CT scans, were crucial in assessing the extent of sinonasal masses. Mucosal thickening was the most common finding, present in 54.88% of left-sided and 52.44% of right-sided cases. This aligns with **Sahoo et al. (2023)[9]**, who also highlighted mucosal thickening as a predominant feature. Bone erosion (25.61%) and fluid collection (15.85%) were noted in progressive cases. CT scans were used in 85% of our cases, consistent with the 85% usage rate reported by **Sahoo et al. (2023)[9]**. These findings reinforce the utility of CT in evaluating bony involvement and intracranial extensions, as also emphasized by **Dongapure et al. (2023) [10]**.

Inflammatory sinonasal polyps were the most common diagnosis in our study, accounting for 47.56% of cases, mirroring the findings of **Sahoo et al. (2023)[9]** and **Dongapure et al. (2023) [10]**. Among benign tumors, juvenile nasopharyngeal angiofibroma (JNA) and inverted papilloma were predominant, consistent with other studies. Malignant neoplasms constituted 12.20% of cases, with squamous cell carcinoma being the most common subtype, as also noted by **Sahoo et al. (2023)[9]** and **Bhalodiya et al. (2020) [11]**.

Our study found a significant correlation in inflammatory cases, with 97.92% agreement across clinical, radiological, and histological diagnoses. However, diagnostic challenges were noted in benign and malignant lesions. In benign cases, 9.52% were misclassified as inflammatory radiologically, and in malignant cases, 30% were initially misdiagnosed as benign. Similar diagnostic difficulties were highlighted by **Dongapure et al. (2023) [10]** and **Bhalodiya et al. (2020) [11]**, underscoring the need for histopathological validation.

Our findings resonate with **Lathi et al. (2011) [8]**, who reported that 71.4% of sinonasal masses were non-neoplastic, with nasal polyps being the most common subtype. Additionally, the predominance of squamous cell carcinoma as the leading malignancy in our study aligns with the findings of **Bhalodiya et al. (2020) [11]**, highlighting its frequency across different populations and clinical contexts.

In summary, this study provides valuable insights into sinonasal masses, emphasizing the importance of an integrated approach combining clinical, radiological, and histopathological evaluations for accurate diagnosis and optimal management.

Recommendations

Further studies with larger sample sizes and multi-center collaboration are recommended to better understand the geographic and

demographic variations in sinonasal masses. Incorporating advanced diagnostic techniques, such as immunohistochemistry and molecular profiling, may improve the differentiation of benign and malignant lesions.

Limitations

This study is limited by its single-center design and relatively small sample size, which may affect the generalizability of the findings. Additionally, the reliance on conventional histopathological methods without advanced molecular diagnostics could limit the depth of tumor characterization.

CONCLUSION

We concluded that sinonasal masses predominantly affect younger individuals, with a slight male predominance. Clinically, nasal obstruction and discharge are the most common presentations, while advanced cases may exhibit proptosis and visual disturbances. Radiological assessments, especially CT scans, play a crucial role in identifying mucosal thickening, fluid collections, and bony erosions. Histopathologically, inflammatory sinonasal polyps are the most common findings, followed by benign and malignant neoplasms. A high concordance was observed in inflammatory cases across clinical, radiological, and histological evaluations, emphasizing the importance of a multidisciplinary approach for accurate diagnosis and effective management.

Conflict Of Interest: The authors declare no conflicts of interest.

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Consent: Written consent from participants has been obtained and preserved.

Ethical Approval: Ethical approval was obtained and documented as per institutional guidelines.

REFERENCES

- Zafar U, Khan N, Afroz N, Hasan SA. Clinicopathological study of non-neoplastic lesions of nasal cavity and paranasal sinuses. *Indian J Pathol Microbiol.* 2008;51(1):26-9. doi: 10.4103/0377-4929.40386.
- Bakari A, Afolabi OA, Adoga AA, Kodya AM, Ahmad BM. Clinico-pathological profile of sinonasal masses: an experience in national ear care center Kaduna, Nigeria. *BMC Res Notes.* 2010;3:186. doi: 10.1186/1756-0500-3-186.
- Rajguru R. Nasal polyposis: current trends. *Indian J Otolaryngol Head Neck Surg.* 2014;66(Suppl 1):16-21. doi: 10.1007/s12070-011-0427-z.
- Bist SS, Varshney S, Baunthiyal V, Bhagat S, Kusum A. Clinico-pathological profile of sinonasal masses: An experience in tertiary care hospital of Uttarakhand. *Natl J Maxillofac Surg.* 2012;3(2):180-6. doi: 10.4103/0975-5950.111375.
- Rawat DS, Chadha V, Grover M, Ojha T, Verma PC. Clinico-pathological Profile and Management of Sino-nasal Masses: A Prospective Study. *Indian J Otolaryngol Head Neck Surg.* 2013 Aug;65 (Suppl2):388-93.
- Eggesbo HB. Imaging of sinonasal tumours. *Cancer Imaging.* 2012;12:136-52. doi: 10.1102/1470-7330.2012.0015.
- Gomaa MA, Hammad MS, Abdelmoghny A, Elsherif AM, Tawfik HM. Magnetic resonance imaging versus computed tomography and different imaging modalities in evaluation of sinonasal neoplasms diagnosed by histopathology. *Clin Med Insights Ear Nose Throat.* 2013;6:9-15. doi: 10.4137/CMEN.TS10678.
- 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 Otorhinolaryngol Ital.* 2011;31(6):372-7.
- Sahoo AK, Sidam S. Clinicopathological Profile of Sinonasal Masses in a Tertiary Care Center in Central India: A Retrospective Study. *Cureus.* 2023. doi: 10.7759/cureus.50700.
- Dongapure S, Shankar AA. Clinicopathological study of sinonasal lesions: 5 years study in a rural hospital general pathological of Nepal. 2023.
- Bhalodiya N, Prajapati KJ, Hingol P, Bhadania S. Clinical, pathological and radiological profile of sinonasal masses in patients presenting to a tertiary care center: a retrospective observational study. *Int J Otorhinolaryngol Head Neck Surg.* 2020;6:1859-66.
- Maheshwari A, Bansal A. Clinicopathological spectrum of sinonasal masses: a tertiary care hospital experience. *Int J Otorhinolaryngol Head Neck Surg.* 2017;3:1015-9.
- Sharma R, Sharma VK, Madhok R, Agarwal T, Mehrotra A, Kochhar A. Uncommon and Atypical Sinonasal Masses: Diagnostic and Therapeutic Challenges. *Clin Rhinol An Int J.* 2012;5(3):114-7.