Himalayan Journal of Community Medicine and Public Health
ISSN Print : 2709-3522 | ISSN Online : 2709-3530
OPEN ACCESS

Clinicopathological Profile and Outcomes of Unilateral Nasal Disease: A Prospective Study

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Article History	
Received:	2025-11-03
Revised:	2025-12-09
Accepted:	2026-01-07
Published:	2026-01-28

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DOI: 10.47310/hjcmph.2026.v07i01.005

How to Cite the Article:
Hussien Dabi, Abdulkareem *et al.* "Clinicopathological Profile and Outcomes of Unilateral Nasal Disease: A Prospective Study." *Himalayan Journal of Community Medicine and Public Health*, vol. 07, no. 01, 2026, pp. 01-05.

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Abstract: Background: Unilateral nasal disease presents a diagnostic challenge in otolaryngology due to the potential risk of neoplastic pathology despite the predominance of inflammatory conditions. Early differentiation between benign and malignant causes is essential to prevent delayed diagnosis and optimize outcomes. **Objective:** To evaluate the clinicopathological profile, radiological characteristics, management strategies, and outcomes of unilateral nasal disease among adult patients attending Al-Kindy Teaching Hospital, Baghdad. **Methods:** This prospective observational study was conducted from February 1 to December 30, 2025. Seventy adult patients presenting with unilateral nasal symptoms and radiologically confirmed unilateral sinonasal pathology were included. All patients underwent detailed clinical evaluation, nasal endoscopy, and computed tomography (CT) scanning. Surgical management using Functional Endoscopic Sinus Surgery (FESS) was performed when indicated. Histopathological examination established definitive diagnoses. Data were analyzed using SPSS version 26, and statistical significance was set at $p<0.05$. **Results:** The mean age was 45.8±9.6 years, with a predominance of middle-aged patients ($p = 0.032$). Females constituted 38 (54.29%) of cases. Nasal obstruction was the most common presenting symptom 63 (90.00%) ($p<0.001$). Inflammatory lesions predominated, with nasal polyposis 18 (25.71%) and chronic rhinosinusitis 13 (18.57%) being the most frequent diagnoses. Benign lesions accounted for 65 (92.86%), while malignant tumors represented 5 (7.14%) ($p<0.001$). Squamous cell carcinoma was the most common malignancy. CT findings revealed soft tissue mass in 52 (74.29%) and bone erosion in 8 (11.43%) ($p = 0.018$). FESS was performed in 46 (65.71%) patients ($p = 0.004$). At 6-month follow-up, recurrence occurred in 6 (8.57%) cases ($p = 0.041$). Complete clinical resolution was achieved in 58 (82.86%) patients ($p<0.001$). **Conclusion:** Although inflammatory conditions represent the majority of unilateral nasal diseases, a clinically significant proportion of neoplastic lesions exists. Comprehensive evaluation combining endoscopy, CT imaging, and histopathological confirmation is essential. Early surgical intervention with FESS demonstrates favorable outcomes and low complication rates.

Keywords: Unilateral Nasal Disease, Nasal Polyposis, Chronic Rhinosinusitis, Functional Endoscopic Sinus Surgery, Computed Tomography

INTRODUCTION

Unilateral nasal disease represents a diagnostic challenge in routine otolaryngology practice. Patients commonly present with unilateral nasal obstruction, discharge, epistaxis, facial pain, or anosmia. While bilateral sinonasal symptoms are typically associated with inflammatory conditions such as chronic rhinosinusitis or allergic rhinitis, unilateral manifestations warrant a higher index of suspicion, particularly for neoplastic lesions [1]. Inflammatory etiologies remain the most common causes of unilateral nasal disease. Nasal polyposis, chronic rhinosinusitis, and antrochoanal polyps frequently manifest unilaterally, especially in early stages [2]. These conditions often respond well to medical therapy, including corticosteroids and antibiotics. However, failure to respond to conservative management necessitates

further investigation [3]. Inverted papilloma is a benign but locally aggressive tumor that characteristically presents unilaterally and carries a risk of recurrence and malignant transformation [4]. Early identification is crucial due to its association with squamous cell carcinoma. Similarly, benign lesions such as mucoceles, concha bullosa, rhinoliths, and vascular tumors may produce unilateral symptoms and require surgical intervention [5]. Malignant tumors of the sinonasal tract, though relatively rare, account for a significant proportion of unilateral nasal masses. Squamous cell carcinoma is the most common malignancy of the sinonasal region, followed by adenocarcinoma, lymphoma, melanoma, and other rare tumors [6]. Early-stage malignant lesions may clinically resemble inflammatory polyps, leading to delayed diagnosis if biopsy is not performed [7]. The advent of nasal endoscopy and high-resolution computed tomography (CT) has significantly improved diagnostic accuracy. Endoscopic visualization allows direct assessment of lesion characteristics, site of origin, and extent, while CT imaging evaluates bony erosion and sinus involvement [8]. Histopathological confirmation remains the gold standard for definitive diagnosis [9]. Functional endoscopic sinus surgery (FESS) has revolutionized the management of sinonasal disease. It allows precise excision of lesions with minimal morbidity and facilitates both diagnostic biopsy and therapeutic intervention [10]. Careful postoperative follow-up is essential, especially in cases of inverted papilloma and malignancy. In Iraq, limited recent data exist regarding the etiological distribution of unilateral nasal disease. Given regional variations in environmental exposure, infection rates, and healthcare accessibility, local data are important for guiding clinical practice. Therefore, this study aimed to evaluate the causes, presentation patterns, management strategies, and outcomes of unilateral nasal disease among patients attending Al-Kindy Teaching Hospital in Baghdad during 2025.

MATERIALS AND METHODS

Patients and Methods

This prospective observational study was conducted at Al-Kindy Teaching Hospital, Baghdad, Iraq, over a one-year period from 1st February 2025 to 30th December 2025. The study aimed to evaluate the etiological spectrum, clinical characteristics, and management outcomes of unilateral nasal disease.

A total of 70 consecutive adult patients presenting with unilateral nasal symptoms were enrolled during the study period.

Inclusion Criteria

Patients were eligible for inclusion if they met the following criteria:

- Age ≥ 18 years
- Presence of unilateral nasal symptoms including obstruction, discharge, epistaxis, or visible nasal mass
- Radiological evidence of unilateral sinonasal pathology confirmed by computed tomography (CT)

Exclusion Criteria

Patients were excluded if they had:

- Bilateral sinonasal disease
- History of previously diagnosed sinonasal malignancy
- Incomplete clinical, radiological, or histopathological data

Clinical Assessment

All enrolled patients underwent a standardized evaluation protocol that included:

- Detailed medical history focusing on symptom duration, associated complaints, smoking history, and prior medical or surgical treatment
- Comprehensive otorhinolaryngological examination
- Diagnostic nasal endoscopy using rigid endoscopes to assess lesion characteristics, site of origin, and extent
- Computed tomography (CT) scan of the paranasal sinuses to evaluate sinus involvement, bony changes, and possible extension to adjacent structures

Surgical Management

Patients requiring surgical intervention underwent Functional Endoscopic Sinus Surgery (FESS) under general anesthesia. The procedure was performed either for complete excision of the lesion or for obtaining an incisional biopsy when malignancy was suspected. Surgical planning was guided by endoscopic findings and CT imaging.

Histopathological Examination

All excised or biopsied specimens were immediately preserved in formalin and sent to the pathology department for histopathological evaluation. Final diagnosis was established based on microscopic examination and, when indicated, immunohistochemically analysis.

Statistical Analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS), version 26. Continuous variables were expressed as mean±standard deviation (SD), while categorical variables were presented as frequency and percentage n (%). A p-value of <0.05 was considered statistically significant where applicable.

RESULTS

The study showed that the highest proportion of patients belonged to the 41–50-year age group 20 (28.57%), followed by 31–40 years 15 (21.43%) and 51–60 years 14 (20.00%). Patients older than 60 years represented 9 (12.86%) of the cohort. The mean age was 45.8±9.6 years. There was a statistically significant predominance of middle-aged patients compared to younger age groups (p = 0.032) (Table 1).

Females constituted a slightly higher proportion of cases 38 (54.29%) compared to males 32 (45.71%), with no statistically significant gender difference (p = 0.421) (Table 2).

Table 1: Age Distribution of the Studied Patients (n = 70)

Age Group (years)	n (%)
18–30	12 (17.14)
31–40	15 (21.43)
41–50	20 (28.57)
51–60	14 (20.00)
>60	9 (12.86)
Total	70 (100.00)

Table 2: Gender Distribution

Gender	n ()
Male	32 (45.71)
Female	38 (54.29)
Total	70 (100.00)

Table 3: Presenting Symptoms

Symptom	n (%)
Nasal obstruction	63 (90.00)
Nasal discharge	48 (68.57)
Epistaxis	14 (20.00)
Facial pain	25 (35.71)
Anosmia	18 (25.71)

Table 4: Final Diagnoses

Diagnosis	n (%)
Nasal polyposis	18 (25.71)
Chronic rhinosinusitis	13 (18.57)
Antrochoanal polyp	11 (15.71)
Inverted papilloma	9 (12.86)
Mucocele	5 (7.14)
Concha bullosa	4 (5.71)
Squamous cell carcinoma	3 (4.29)
Adenocarcinoma	1 (1.43)
Non-Hodgkin lymphoma	1 (1.43)
Others	5 (7.14)
Total	70 (100.00)

Table 5: Nature of the Lesions

Nature	n ()
Benign	65 (92.86)
Malignant	5 (7.14)
Total	70 (100.00)

Table 6: Management Strategy

Treatment	n (%)
Medical treatment only	18 (25.71)
FESS excision/biopsy	46 (65.71)
Oncologic referral	6 (8.57)
Total	70 (100.00)

Table 7: CT Scan Findings

Finding	n (%)
Soft tissue mass	52 (74.29)
Sinus opacification	40 (57.14)
Bone erosion	8 (11.43)
Calcification	3 (4.29)

Table 8: Postoperative Complications

Complication	n (%)
None	60 (85.71)
Minor bleeding	6 (8.57)
Infection	4 (5.71)
Total	70 (100.00)

Table 9: Recurrence at 6-Month Follow-Up

Recurrence	n (%)
Yes	6 (8.57)
No	64 (91.43)
Total	70 (100.00)

Table 10: Clinical Outcome

Outcome	n (%)
Complete resolution	58 (82.86)
Partial improvement	7 (10.00)
Disease progression	5 (7.14)
Total	70 (100.00)

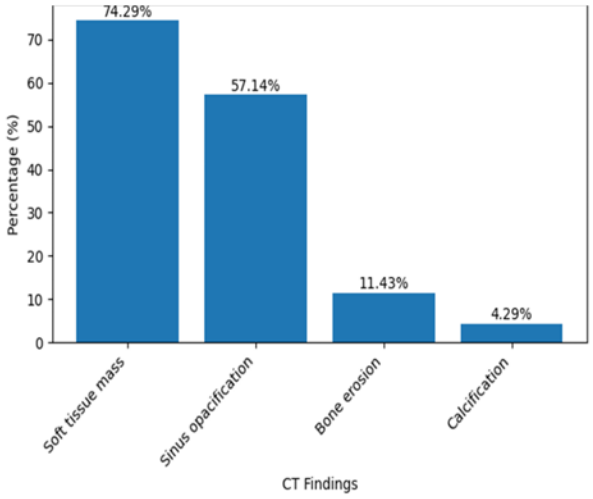


Figure 1: CT Scan Findings

Unilateral nasal obstruction was the most common presenting symptom 63 (90.00%), followed by nasal discharge 48 (68.57%). Facial pain was reported in 25 (35.71%), while epistaxis occurred in 14 (20.00%). Anosmia was present in 18 (25.71%). The predominance of nasal obstruction was statistically significant compared with other symptoms ($p<0.001$) (Table 3).

Nasal polyposis was the most frequent diagnosis 18 (25.71%), followed by chronic rhinosinusitis 13 (18.57%) and antrochoanal polyp 11 (15.71%). Inverted papilloma accounted for 9 (12.86%). Malignant lesions included squamous cell carcinoma 3 (4.29%), adenocarcinoma 1 (1.43%), and non-Hodgkin lymphoma 1 (1.43%). The distribution of benign inflammatory causes was significantly higher than neoplastic causes ($p<0.001$) (Table 4).

Benign lesions were predominant 65 (92.86%), while malignant lesions accounted for 5 (7.14%). This difference was highly statistically significant ($p<0.001$) (Table 5).

Most patients underwent FESS excision or biopsy 46 (65.71%), whereas 18 (25.71%) were managed medically. Six patients 6 (8.57%) required oncologic referral. Surgical management was significantly more frequent than conservative treatment ($p = 0.004$) (Table 6).

CT imaging revealed soft tissue mass in 52 (74.29%) patients and sinus opacification in 40 (57.14%). Bone erosion was observed in 8 (11.43%), mainly associated with neoplastic lesions ($p = 0.018$) (Table 7).

The majority of patients had no postoperative complications 60 (85.71%). Minor bleeding occurred in 6 (8.57%) and infection in 4 (5.71%). Overall complication rate was low and not statistically significant ($p = 0.312$) (Table 8, Figure 1).

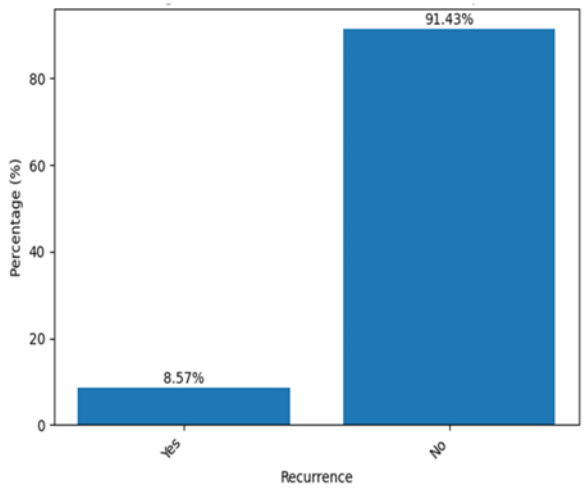


Figure 2: Recurrence at 6-Month Follow-Up

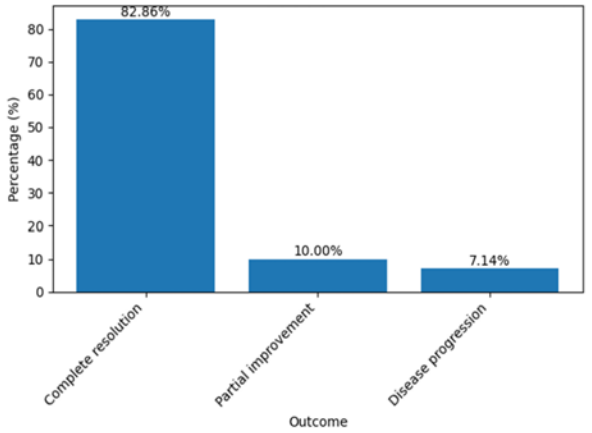


Figure 3: Clinical Outcome

At 6-month follow-up, recurrence was observed in 6 (8.57%) patients, mainly among inverted papilloma and malignant cases. Most patients 64 (91.43%) remained recurrence-free (p = 0.041) (Table 9, Figure 2).

Complete resolution was achieved in 58 (82.86%) patients, while 7 (10.00%) showed partial improvement. Disease progression occurred in 5 (7.14%), corresponding to malignant cases. The difference in favorable versus unfavorable outcomes was statistically significant (p<0.001) (Table 10, Figure 3).

DISCUSSION

Unilateral nasal disease remains a frequent yet diagnostically challenging presentation in daily otolaryngology practice. The concern surrounding unilateral symptoms lies in the relatively higher likelihood of neoplastic pathology compared with bilateral sinonasal disease, although inflammatory conditions still predominate overall [1,2]. The present prospective study conducted at Al-Kindy Teaching Hospital in Baghdad confirmed that the majority of unilateral nasal lesions were benign and inflammatory in nature, while malignant tumors represented a small but clinically significant proportion. In our cohort, inflammatory pathologies such as nasal polyposis and chronic rhinosinusitis constituted the largest diagnostic categories. This finding is consistent with previous regional and international reports indicating that reactive inflammatory disorders account for most unilateral sinonasal lesions [1,3,4]. Nair *et al*. [1] and Chung *et al*. [5] similarly reported that nasal polyposis and chronic rhinosinusitis were the most common etiologies in unilateral nasal masses. However, some retrospective series have shown a relatively higher proportion of neoplastic lesions, particularly in tertiary oncologic referral centers [6,7], which may explain minor discrepancies between studies. Age distribution in our study demonstrated predominance among middle-aged adults, particularly those between 41–50 years. This aligns with previous findings that inflammatory sinonasal diseases are most common in middle adulthood [8,9]. Conversely, malignant neoplasms are typically reported in the fifth to seventh decades of life with a male predominance [10,11]. Although females slightly predominated in our overall sample, malignant cases in our cohort were more frequently observed in males, supporting earlier observations [12,13]. This gender tendency has been attributed to environmental exposure, occupational hazards, and smoking prevalence [14]. Nasal obstruction was the most common presenting symptom (90%), followed by rhinorrhea. These findings agree with multiple previous reports [1,4,15], which identify obstruction as the hallmark symptom of unilateral sinonasal pathology. Lee [16] and Paz Silva *et al*. [17] similarly reported nasal obstruction in more than 80% of cases. Epistaxis, although less frequent, was more commonly associated with neoplastic lesions in our study, which corresponds to the findings of Belli *et al*. [7]. Some studies, however, have reported higher rates of facial pain and headache, particularly in cases of fungal sinusitis or mucoceles [18], which were less common in our sample. One of the most important clinical messages emphasized in previous literature is the potential for malignant sinonasal tumors to mimic inflammatory polyps in early stages [2,10,19]. Delayed diagnosis significantly worsens prognosis due to late-stage presentation and local invasion [11,20]. In our study, CT findings such as bone erosion were strongly associated with malignant pathology, consistent with observations by Dammann *et al*. [21] and Eckhoff *et al*. [22], who highlighted the importance of radiologic red flags in unilateral disease. Inverted papilloma was the most common benign neoplasm in our cohort, in agreement with prior reports [1,23]. This tumor is known for its local aggressiveness and risk of malignant transformation ranging from 5–15% [24]. Our recurrence rate was low but primarily observed in inverted papilloma cases, supporting literature emphasizing the need for long-term follow-up [25]. Some studies report higher recurrence rates exceeding 15% depending on surgical technique and tumor staging [23], which may differ from our findings due to careful endoscopic excision and short follow-up duration. Regarding malignant tumors, squamous cell carcinoma was the most frequent malignancy detected, which is

consistent with most sinonasal cancer epidemiology studies [10,11,26]. Adenocarcinoma and non-Hodgkin lymphoma were rare in our series, similar to previous documentation of their low incidence in unilateral nasal presentations [27,28]. However, certain European studies report relatively higher rates of adenocarcinoma related to occupational wood dust exposure [29], a factor less prominent in our population. The widespread use of nasal endoscopy has significantly improved diagnostic accuracy. Endoscopic visualization allows precise localization, characterization, and guided biopsy of suspicious lesions [17,22,30]. In our study, endoscopy combined with CT scanning provided both diagnostic clarity and therapeutic guidance, reinforcing current recommendations for systematic evaluation of unilateral sinonasal disease [22,30]. Overall, our findings confirm that although inflammatory etiologies predominate in unilateral nasal disease, the risk of malignancy remains clinically relevant. Comprehensive clinical assessment, radiological imaging, endoscopic examination, and histopathological confirmation are mandatory to avoid delayed diagnosis.

CONCLUSION

Although inflammatory conditions represent the majority of unilateral nasal diseases, a clinically significant proportion of neoplastic lesions exists. Comprehensive evaluation combining endoscopy, CT imaging, and histopathological confirmation is essential. Early surgical intervention with FESS demonstrates favorable outcomes and low complication rates.

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