

A Clinicopathological Radiological Correlation of Unilateral Sinonasal Masses

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ABSTRACT

Introduction: Unilateral sinonasal masses are frequently encountered and a benign appearance may conceal their true malignant nature. This study aimed to investigate the clinical presentations of unilateral sinonasal masses, analyze their radiological results, and establish a correlation with histological findings.

Materials and methods: The study was conducted on 81 patients who presented with a unilateral sinonasal mass at our ENT department, Command Hospital Air Force Bengaluru, between 2014 and 2016. The patients had routine hematological and biochemical tests, diagnostic nasal endoscopy, and NCCT/MRI of the paranasal sinuses. A preoperative biopsy was performed if deemed necessary. Following the initial evaluation, the patient underwent either endoscopic or open operation. The histological examination and immunohistochemistry results were then analyzed and evaluated.

Results and observations: The study revealed the presence of 44 cases of inflammatory polyps, 3 cases of adenoid cystic carcinoma, 19 cases of inverted papilloma, 5 cases of fungal sinusitis, and 3 cases of squamous carcinoma. Additionally, there was one case each of solitary fibrous tumor, angiofibroma, odontogenic keratinizing tumor, Non-Hodgkins lymphoma, adenocarcinoma, and acinic cell tumor. A detailed review of the clinical, radiographic, and histological data was conducted for all 81 cases of unilateral sinonasal mass.

Conclusion: Thorough assessment of sinonasal masses using radiographic, histological, and immunohistochemical methods improves in precise diagnosis and appropriate treatment. Histopathology usually offers a definitive diagnosis; however, in certain cases, immunohistochemistry serves as the ultimate diagnostic method for correct identification.

Keywords: Histopathology, Sinonasal mass, Unilateral.

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INTRODUCTION

The occurrence of a nasal mass is a frequently observed condition in the outpatient ENT department of any hospital. These masses cause a variety of symptoms, including nasal blockage, headaches, nosebleeds, and damage to nearby structures. The presence of masses causes inflammation to the surrounding tissue, leading to alterations in the local anatomy and physiology, which complicates the clinical presentation. The first symptomatology of both benign and malignant tumors is nearly identical. Therefore, a comprehensive clinical and radiological evaluation is crucial for establishing an accurate diagnosis. However, the clinician must consider the possibility of underlying malignancies when noticing a unilateral nasal mass. Patients presenting with such findings should have a thorough endoscopic examination. If there is any suspicion, imaging techniques should be employed to establish an accurate differential diagnosis. Unless proven otherwise, all unilateral mass lesions should be considered as malignant lesions.¹ Sinonasal masses can be categorized into malignant tumors, benign tumors, and non-neoplastic lesions. The most commonly observed malignant tumors are squamous cell carcinomas, while benign lesions are often nasal polyps.² In addition to this, a diverse range of nasal conditions, such as mucocele, inverted papilloma, and fungal diseases can manifest as a unilateral nasal tumor.

The objective of this study was to provide a comprehensive analysis of the symptoms, clinical findings, lesion sites, histological investigation results, and therapeutic options for unilateral sinonasal masses.

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MATERIALS AND METHODS

An observational study was carried out on 81 patients who presented with unilateral masses in their nasal cavities. These patients were examined in the outpatient department of ENT at Command Hospital Bengaluru over 3 years, from 2014 to 2016. A detailed history was recorded, including information about the individual's age, gender, occupation, place of residence, symptoms, and the time at which they first appeared. Standard biochemical and hematological assessments were conducted. The procedure involves examining the nasal cavity using an endoscope, as well as obtaining computed tomography (CT) scans of the nose and paranasal sinuses (PNS). The CT scans are taken from different angles, including coronal and axial views. A provisional clinical diagnosis was established. An endoscopic biopsy was performed in cases

Table 1: Clinical presentation of patients

Symptoms	Average duration (months)	Number
Nasal obstruction	4	70
Nasal discharge	3	27
Sneezing	2	10
Loss of smell	2	29
Epistaxis	3 weeks	31
Deformity of nasal pyramid	1	2
Mouth breathing	1	6
Headache	1	16
Watering from eye	1	3
Double vision	2	2
Pain in the ears	1	2

when the clinical examination raised suspicion of a non-benign lesion. The tissues underwent histological examination and were stained using hematoxylin and eosin stains. Immunohistochemistry was performed if necessary. Informed written consent was obtained from all patients for the study. Approval was received from the Institutional Ethics Committee. The final histological diagnosis was compared with the provisional clinical diagnosis.

RESULTS

The study revealed that the average age of the patients was 43, and there were 8 males for every 1 female in the sample. The most often reported symptom upon presentation was nasal blockage (Table 1). The mean duration of the presentation was 4 months. During anterior rhinoscopy, a unilateral nasal mass was observed in 74 patients, accounting for 91% of the cases. The nasal mass exhibited a polypoidal appearance in 63 cases, a fleshy feature in 7 cases, and a proliferative appearance in 4 cases. After rhinoscopy, a mass was observed in 40 patients. Probing was conducted on all patients presenting with nasal masses, the majority of which showed a soft consistency. Three patients experienced spontaneous bleeding upon touch. One patient exhibited a palatal bulge, while two patients experienced proptosis and diplopia. A palpable cervical lymph node was observed in two patients, whereas cranial nerve involvement was observed in one patient.

All cases underwent a CT scan of the paranasal sinuses, with or without contrast. Magnetic resonance imaging (MRI) of the PNS was performed in 26 cases. PET-CT was performed in five cases, while angiography was performed in one case. Endoscopic biopsy had been taken in 30 cases. However, the results were inconclusive in 3 cases, notably 1 case of neurofibroma, 1 case of solitary fibrous tumor, and 1 case of non-Hodgkin’s lymphoma. Additionally, the biopsy results were incorrect in five cases of inverted papilloma, which were erroneously labeled as inflammatory polyps. Additionally, two cases of adenoid cystic carcinoma were incorrectly identified as inverted papilloma. One individual underwent a repeated endoscopic biopsy, which was followed by the use of immunohistochemistry to confirm the diagnosis of non-Hodgkins lymphoma.

The provisional clinical diagnosis based on imaging and biopsy (Table 2) revealed nasal polyposis in 49 cases, malignancy in 7 cases, and inverted papilloma in 16 cases. Functional endoscopic sinus surgery (Table 3) was performed to manage nasal polyps,

Table 2: Clinical diagnosis

Provisional clinical diagnosis	Number	Percentage
Nasal polyposis	49/81	60.4%
Carcinoma	7/81	8.6%
Inverted papilloma	16/81	19.7%
Benign tumors	3/81	3.7%
Juvenile angiofibroma	1/81	1.2%
Fungal sinusitis (chronic noninvasive)	5/81	6%

Table 3: Type of surgery

Surgery	Number (n = 80)	Percentage
FESS	54	67.5%
Endoscopic medial maxillectomy	08	10%
Endoscopic Draf 2B	01	1.25%
Medial maxillectomy	13	16.25%
Total maxillectomy	03	3.75%
Infrastructural maxillectomy	01	1.25%

Table 4: Histopathological diagnosis

Histopathological diagnosis	Number (n = 81)	Percentage
Nasal polyp	44	54.3%
Squamous carcinoma	3	3.6%
Adenoid cystic ca	3	3.6%
Inverted papilloma	19	23%
Solitary fibrous tumor	1	1.2%
Angiofibroma	1	1.2%
Fungal sinusitis chronic noninvasive	5	6%
Acinic cell tumor	1	1.2%
Odontogenic keratocyst	1	1.2%
Non-Hodgkins lymphoma	1	1.2%
Adenocarcinoma	1	1.2%
Neurofibroma	1	1.2%

fungal sinusitis, and five cases of inverted papilloma that presented with symptoms similar to nasal polyps. Additionally, one case of odontogenic keratocyte was also treated. Endoscopic medial maxillectomy was performed as a revision procedure in all five cases of inverted papilloma.

Endoscopic medial maxillectomy was performed in 8 cases of inverted papilloma. Three cases of squamous cancer underwent total maxillectomy. Medial maxillectomy was performed on 13 patients, including 7 cases of inverted papilloma, 1 case of angiofibroma, 3 cases of adenoid cystic carcinoma, 1 case of neurofibroma, and 1 case of a solitary fibrous tumor. An endoscopic Draf 2b procedure was performed in one case of adenocarcinoma. Infrastructure maxillectomy was performed for a case of acinic cell tumor. A single patient diagnosed with non-Hodgkin’s lymphoma was referred for chemotherapy treatment.

The histopathology findings (Table 4) revealed the presence of 44 cases of inflammatory polyp, 3 cases of adenoid cystic carcinoma, 1 case of solitary fibrous tumor, 19 cases of inverted papilloma, 1 case of angiofibroma, 5 cases of fungal sinusitis, 3 cases of



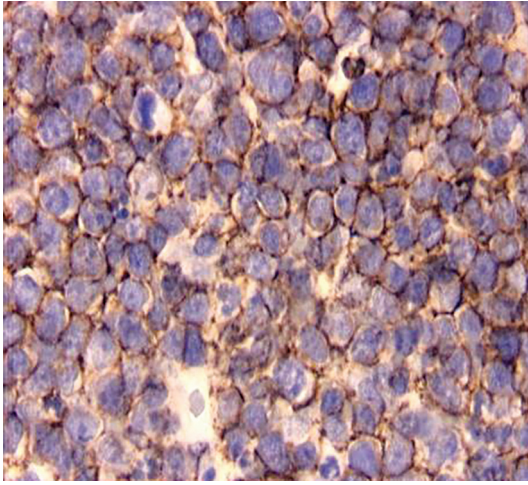


Fig. 1: Immunohistochemistry CD 10-positive photograph of non-Hodgkins lymphoma showing numerous foamy histiocytes

squamous carcinoma, 1 case of odontogenic keratinizing tumor, and 1 case of acinic cell tumor. The occurrence of numerous etiologies leading to pyomucocele (as seen on MRI) was observed in 2 patients with inverted papilloma and chronic noninvasive fungal sinusitis, 1 patient with nasal polyp, and 1 case of odontogenic keratocyte during surgery.

OBSERVATIONS

A histopathological study was performed on a total of 81 individuals. Among them, 52 patients had non-neoplastic conditions, 20 patients had intermediate tumors, and 9 patients had neoplastic tumors. Immunohistochemistry was performed in three patients to confirm the diagnosis. One case of recurrent fibrous nasal tumor, neurofibroma (s-100 positive), and non-Hodgkin's lymphoma (Fig. 1) were confirmed.

The histopathological result modified the clinical diagnosis in 7 out of 81 individuals (8.6%). The clinical and histological diagnosis remains constant. Five individuals with clinically benign lesions were first diagnosed as having inflammatory polyps. However, after histopathological examination, all of these lesions were reclassified as inverted papillomas. Therefore, a revision procedure called endoscopic medial maxillectomy was performed. Two instances of adenoid cystic carcinoma were first diagnosed as inverted papilloma based on clinical radiological examination, while the biopsy results were equivocal. However, both cases underwent medial maxillectomy and the final histological diagnosis confirmed adenoid cystic carcinoma. However, in each of these cases, the margins were clear and so did not necessitate further surgical modification. Revision surgery was performed on five individuals with inverted papilloma due to a discrepancy between the initial clinical and radiological findings of a polyp and the final histological diagnosis of inverted papilloma. Revision endoscopic medial maxillectomy was performed in these cases. Oral antifungals were prescribed to treat chronic noninvasive fungal sinusitis in five patients. Adjuvant radiation was administered to six patients with carcinoma.

DISCUSSION

Lesions in the nasal cavity, PNS, and nasopharynx are a group of masses that exhibit a wide range of histological characteristics.

Clinical differentiation of various non-neoplastic and neoplastic lesions is challenging. Failure to differentiate between benign and malignant conditions during the initial presentation might lead to a delay in diagnosing and treating the condition.

The objective of this study was to investigate the symptoms, clinical findings, location, histological test results, and the application of immunohistochemistry in unilateral nasal growths.

Unilateral sinonasal mass lesions account for 6% of all paranasal diseases.³ Inflammatory or neoplastic etiologies play a role in its etiology. Kahveci et al.⁴ conducted a study on 127 cases and observed that 25.2% of the cases with unilateral sinonasal masses were attributed to neoplastic origins, while 74.8% were attributed to inflammatory reasons.

The average age of the patients in our study was 43 years, with a male-to-female ratio of 8 to 1. The most frequent symptom reported was nasal obstruction, with an average time of presentation occurring 4 months following the onset of symptoms. A unilateral polypoidal growth was the most common finding during the examination.

Radiological studies may help understand the type of pathology, the extent of the condition, and any accompanying sinus-related complications. Magnetic resonance imaging was performed on a cohort of 24 individuals to assess the extent of sinonasal masses within the orbit and intracranial cavity, to visualize the precise extent of soft tissue involvement in individuals with suspected malignant masses extending into the orbit or intracranial region. The reliability of CT scans in determining the extensions of sinonasal mass lesions is limited due to the potential misinterpretation of retained or inspissated secretions and thicker mucosa within the PNS as expansions of malignancy, resulting in false-positive results. An MRI assessment is necessary even after a CT scan of the PNS to distinguish between actual disease infiltration and blockage caused by infiltration of the draining Ostia.⁵ Magnetic resonance imaging is crucial for determining the extent of soft tissue infiltration surrounding the tumor, which is essential for assessing its resectability. An important benefit of MRI is its ability to differentiate between tumors and accumulated secretions in the various sinus cavities.⁶ For a more thorough examination when there is suspicion of an intranasal tumor, CT of the PNS should be the preferable imaging method.⁷ Computer tomography PNS can assist in determining the stage of the disease and help with the process of surgical planning. Computer tomography PNS were performed in all cases in our study.

Role of Endoscopic Biopsy

If there is a suspicion of malignancy or a different type of pathology following the initial radiological imaging of intranasal masses, taking endoscopic biopsy material can help in determining the appropriate treatment regimen. Endoscopic biopsy was performed in 30 patients, and the results were inconclusive in 3 cases. There was one case of neurofibroma, one case of a solitary fibrous tumor, one case of non-Hodgkin lymphoma (NHL), and incorrect labeling in five cases of inverted papilloma, which were mistakenly identified as inflammatory polyps. Additionally, there were two cases of adenoid cystic carcinoma. In some instances, it may be necessary to perform multiple biopsies to definitively establish a diagnosis, as observed in one case of NHL.

Four patients with inverted papilloma and two patients with nasal polyps showed different etiologies during surgery-associated

pyomucocele. One case of nasal polyp was accompanied by fungal sinusitis, which could be differentiated with the use of MRI.

Histopathology was performed on all individuals in our study. The distribution of various lesions into non-neoplastic and neoplastic in our study was compared with other studies. Nasal polyps were the most prevalent benign lesions observed in 44 out of 81 patients. Of the malignant lesions observed in patients, carcinoma was the most prevalent. The most common histological types were squamous cell carcinoma and adenoid cystic carcinoma, which were observed in three cases. Adenoid cystic carcinoma is the most common malignant tumor found in the salivary glands, namely, in the sinonasal region.² The most common site of involvement is the maxillary sinus, accounting for 48% of cases. This is followed by the nasal cavity (24%), ethmoid sinus (16%), and sphenoid sinus in our study was seen in three cases.

Inverted papillomas are the most frequently detected lesions among all sinonasal papillomas.⁸ In our study, we observed a high occurrence of inverted papilloma lesions, with 19 out of 81 cases (23%) being affected. This percentage was slightly higher compared with the data reported by Humayun et al.⁹ Although it is a benign lesion, it can have serious consequences if not treated and monitored properly. In a separate study conducted by Kucur et al.¹⁰ it was found that 10 out of 46 nasal masses were diagnosed as inverted papilloma. The rate of malignant transformation may be as high as up to 11%,¹¹ even though it is a benign lesion. However, from a clinical perspective, it exhibits characteristics of a potentially dangerous pathology if not treated and monitored properly. In their study, Califano et al.¹² found that inverted papilloma can potentially be linked to squamous cell carcinoma of the sinonasal cavity, as observed in 6 out of the 28 cases (21.4%). Therefore, it is essential to conduct a thorough histological evaluation of excised specimens of inverted papilloma.

The histopathological examination is definitive for diagnosing the polypoid lesions. It is the only method for determining the nature of the disease, whether it is inflammatory or malignant. However, the initial endoscopic biopsy may lack conclusiveness or accuracy because of the possibility of a true representative sample. Therefore, it is critical to exercise cautious clinical and radiological judgment before considering surgical excision. The majority of non-neoplastic and benign neoplastic growths in the nose necessitate surgical removal, whereas malignant growths in the nose require wide surgical removal along with possible additional treatment such as radiotherapy. Regular monitoring is essential for detecting any recurrence or metastases.

Correlation of Clinical, Radiological, and Histopathological Correlation

In this study, a total of 7 patients (8.6%) exhibited differences in their clinical, radiological, and histopathological characteristics. Another study found that 1.1% of patients had histopathological findings that did not match their clinical diagnosis.¹³ A study conducted by Kale et al.¹⁴ found that just 0.3% of their patients showed histopathological findings that deviated from their initial clinical diagnosis. Another study found that there was a significantly higher occurrence of differences between histology reports and clinical opinions in 6% of cases.¹⁵ All of these studies^{13–15} indicate that histopathological examination continues to be the most reliable method for diagnosis in most of the cases.

CONCLUSION

It is important to carry out an in-depth assessment of patients reporting symptoms in the unilateral nasal cavity. The clinical manifestation of unilateral sinonasal lesions may be identical, and represent diagnostic and therapeutic dilemmas. The early presentation of non-neoplastic and neoplastic lesions may exhibit identical characteristics, which can cause a considerable delay in making a diagnosis. Accurate diagnosis requires the correlation of clinical, radiological, and pathological modalities. All of these modalities are mutually complementary. In situations where there is a discrepancy between the clinical, radiological, and histological findings, it may be necessary to consider an alternative pathological explanation. An extensive histopathological assessment, supported by immunohistochemistry, is crucial and forms an integral element of the diagnostic process for patients with sinonasal masses.

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