

Original Research Article

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Clinicopathologic and radiologic features of pediatric unilateral nasal masses at a tertiary hospital

Eman R. Alanazi*, Ali A. Almomem, Hadeel M. Aljafer,
Ghaleb M. Alazze, Abdurahamn M. Alkhatib

Department of Otorhinolaryngology and Head and Neck Surgery, King Fahad Specialist Hospital, Dammam Eastern, Saudi Arabia

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***Correspondence:**

Dr. Eman R. Alanazi,

E-mail: eman1990@icloud

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ABSTRACT

Background: Cases of unilateral nasal masses (UNM's) are usually inflammatory but some are neoplastic in nature. We conducted this study to determine the clinic-pathologic features, radiological findings and patterns of UNM's in our institution.

Methods: We conducted a retroactive chart review of all pediatric cases followed and treated for medically untreatable UNM from 2015 till 2018 at King Fahad Specialist Hospital (KFSH) in Dammam, Saudi Arabia.

Results: Cases of 25 patients (16 males and 9 females) with a mean age of 10.81 ± 4.53 years were studied. There were 12 patients (48.0%) who presented with a nasal obstruction, and nasal polyp was found by fiberoptic nasal endoscopy (FNE) in 12 patients (48.0%). Two patients (8.0%) had unremarkable FNE findings. The most common site of origin of the mass was the ethmoid sinus (24.0%). Twenty patients (80.0%) had FESS, 3 (12.0%) had endoscopic excision, 1 had FESS plus abscess drainage and 1 (4.0%) had marsupialization. Two patients (8.0%) had recurrence 12 months after surgery, and one patient (4.0%) had recurrence six months after surgery. Six patients (24.0%) had malignant tumor of which 3 patients (12.0%) expired from the disease.

Conclusions: Pediatric patients with a UNM may present with varied symptoms and may show unremarkable results with nasal endoscopy. However the risk of having an underlying malignant process is very high, thus a histopathologic diagnosis is warranted to confirm the diagnosis.

Keywords: Clinical, Nasal masses, Pathological, Pediatric, Radiological

INTRODUCTION

Unilateral nasal mass (UNM) is an abnormal growth in one side of the nose which can be benign or malignant. It can be present at birth as a congenital anomaly or can develop in the adult life. Among UNM's, polyps are the most common which can occur among adults (age group 40 years and above), and has a prevalence of about 37.06%.^{1,2} Schwannoma, a benign tumor also presents as a UNM in 4% of patients with head and neck tumors.³ Cases of pleomorphic adenoma has also been reported to cause unilateral nasal obstruction presenting as a UNM.^{4,5}

Other reported cases of UNM include chronic sinusitis, allergic fungal sinusitis, papilloma, squamous cell carcinoma, mucocoele and papilloma virus polyp.⁶

Presenting clinical symptoms of patients with UNM's include nonspecific symptoms including nasal obstruction, epistaxis, nasal congestion, rhinorrhea, facial pain, and dental and orbital complaints which are more common among cases of neoplastic origin.^{7,8} Among pediatric patients, UNM commonly presents with unilateral nasal congestion, nasal obstruction, headache and ophthalmologic complaints.⁷

Histopathological findings of patients with UNM's are usually inflammatory in nature in 83% of cases and 17% are of neoplastic in nature.^{8,9} Rhinolithiasis, which is uncommon among pediatric patients presents with UNM and may be confused with several pathologic entities including polyps and tumors.^{9,10} Because of this, histologic confirmation is warranted to determine the exact etiology.² A careful history, endoscopic examination together with a routine histopathological examination of the mass is therefore mandatory to identify the etiology of the disease.^{6,8} Other diagnostic procedures that will aid in the diagnosis of UNM's include CT of the nose and paranasal sinuses, endoscopy, and other imaging modality of choice.^{3,8,11,12}

Pediatric patients presenting with UNM poses a clinical challenge on account of the varied differences in the underlying etiologies. Because of this, we conducted this study to determine the demographic characteristics and presentation of pediatric patients presenting with UNM, its clinic-pathologic features, radiological findings and patterns of unilateral nasal obstruction in our institution.

METHODS

We conducted a retroactive chart review of all pediatric cases followed and treated for UNM from 2015 till 2018 at King Fahad Specialist Hospital (KFSH) in Dammam, Saudi Arabia.

Inclusion criteria

Medically untreatable cases of UNM in the nasal cavity, paranasal sinuses and nasopharynx requiring surgical treatment were included in the study.

Exclusion criteria

Cases with bilateral nasal masses, chronic rhinosinusitis and adult patients were excluded in the study.

Because of the rarity of pediatric patients presenting with UNM, the sample size calculation for our study was unknown at the start (as suggested by Van der Lee et al, 2007), thus we deemed to include all cases that were diagnosed, followed and treated for UNM during the aforementioned time frame.¹³

Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0 (SPSS Inc., Armonk, New York, USA). Results were presented as number and percentage (for categorical variables) and as mean and standard deviation (for continuous variables). The study was approved by the Institutional Review Board (IRB) of KFSH, Dammam, Saudi Arabia.

RESULTS

There were 25 patients that were included in the study, 16 (64.0%) males and 9 (36.0%) females, and all were Saudi

nationals. The mean age of all patients was 10.81 ± 4.53 years (range: 4 months to 17 years). The most common presenting symptom was nasal obstruction (n=12, 48.0%), followed by headache in 3 patients (12.0%). There were 11 patients (44.0%) who presented with 2 or more symptoms. The mean duration of symptoms was 12.44 ± 11.69 months (range: 3 days to 36 months). The mean follow-up time of all patients was 20.95 ± 16.84 months (range: 1-60 months). Table 1 shows the detailed demographic characteristics of all 25 patients. Figure 1 shows the detailed presenting symptoms of the 25 patients.

Table 1: Demographic characteristics of all pediatric patients with UNM's (n=25).

Variables	Mean (SD)	N	%
Age (in years)	10.81 (4.53)		
Duration of symptoms (in months)	12.44 (11.69)		
Follow-up time (in months)	20.95(16.84)		
Gender			
Male		16	64.0
Female		9	36.0

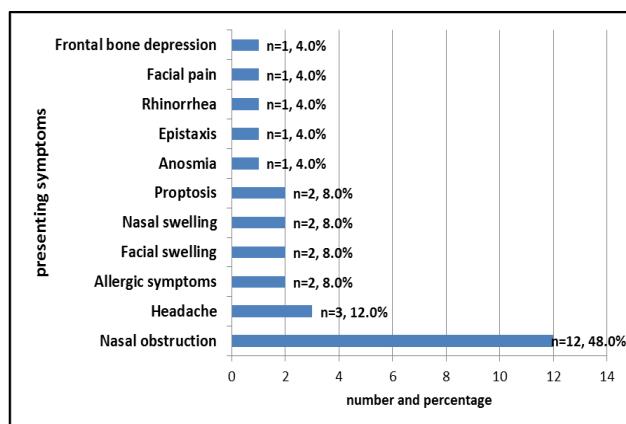


Figure 1: Presenting symptoms of pediatric patients with UNM (n=25).

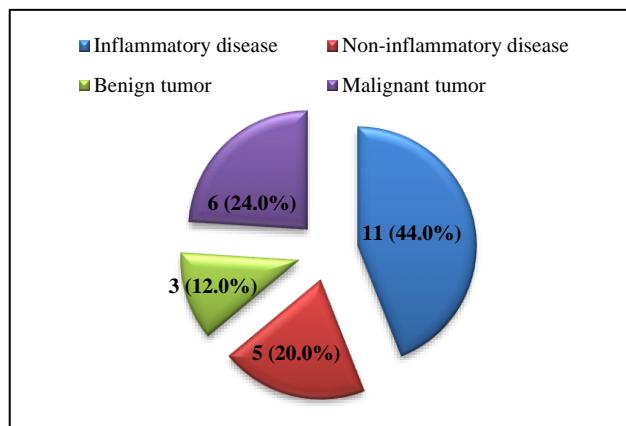
Inflammatory nasal polyp was the most common clinical finding by fiberoptic nasal endoscopy (FNE) (n=12, 48.0%) followed by a nasal mass in 8 patients (32.0%). Two patients (8.0%) had unremarkable FNE findings. Radiological findings showed opacification of the paranasal sinuses in 9 patients (36.0%), skull base defect in 4 patients (16.0%), opacification of the maxilla in 3 patients (12.0%) and nasopharyngeal mass in 3 patients (12.0%). Nasal septum deviation was seen in 10 patients (40.0%), seven to the left and 3 to the right. The most common site of origin of the mass was the ethmoid sinus in 6 patients (24.0%), maxillary sinus in 5 patients (20.0%) and sphenopalatine foramen in 4 patients (16.0%). Inflammatory nasal polyp was the most common histological finding in 11 patients (44.0%). Table 2 shows the detailed clinical findings by fiberoptic nasal endoscopy, radiology, and site of origin of UNM's.

Table 2: Detailed clinical findings by fiberoptic nasal endoscopy, radiology, and site of origin in pediatric patients with UNM's (n=25).

Findings	N	%
Fiberoptic nasal endoscopy		
Inflammatory nasal polyp	12	48.0
Nasal mass	8	32.0
Unremarkable	2	8.0
Nasal congestion	1	4.0
Nasopharyngeal mass	1	4.0
Septum mass	1	4.0
Radiological findings		
Paranasal sinus opacification	9	36.0
Skull base defect	4	16.0
Maxillary opacification	3	12.0
Nasopharyngeal opacification	3	12.0
Nasal cavity opacification	2	8.0
Septum opacification	1	4.0
Ethmoid opacification	1	4.0
Frontal and ethmoid opacification	1	4.0
Soft tissue mass	1	4.0
Site of origin		
Ethmoid sinus	6	24.0
Maxillary sinus	5	20.0
Sphenopalatine foramen	4	16.0
Maxillary, ethmoid and sphenoid sinuses	3	12.0
Osteomeatal complex	2	8.0
Skull base	2	8.0
Frontal sinus	1	4.0
Septum	1	4.0
Superior attachment of middle turbinates	1	4.0
Histology		
Inflammatory nasal polyp	11	44.0
Angiofibroma	3	12.0
Rhabdomyosarcoma	3	12.0
Fungal sinusitis	2	8.0
Encephalocele	1	4.0
Meningocele	1	4.0
Ewing's sarcoma	1	4.0
Nasopharyngeal carcinoma	1	4.0
NHL-Burkitt's lymphoma	1	4.0
Granulomatous inflammation	1	4.0

Nineteen patients (76.0%) had benign conditions (11 patients with inflammatory disease and 8 patients with non-inflammatory conditions), whereas 6 patients (24.0%) had malignant tumors (Figure 2). Three patients (12.0%) were positive for *Aspergillus niger* on culture. Twenty patients (80.0%) had functional endoscopic sinus surgery (FESS), 3 (12.0%) had endoscopic excision with reconstruction of the skull base, one patient (4.0%) had FESS plus abscess drainage and one patient (4.0%) had marsupialization. Seventeen patients (68.0%) had no recurrence of the disease after surgical management, two

patients (8.0%) had recurrence 12 months after surgery, and one patient (4.0%) had recurrence six months after surgery. Two patients (8.0%) were lost to follow-up. Of the six patients who had malignant tumor, 3 patients (12.0%) expired from the disease (two patients from rhabdomyosarcoma, and one patient from Ewing's sarcoma), whereas the other two patients (one with rhabdomyosarcoma and one with NHL Burkitt's lymphoma) had no residual disease at follow-up (Table 3).

**Figure 2: Type of diseases in pediatric patients with UNM (n=25).****Table 3: Type of disease, culture, surgical approach and outcome of patients with UNM (n=25).**

Variables	N	%
Type of disease		
Benign conditions	11	44.0
Inflammatory disease	11	44.0
Non-inflammatory disease	8	32.0
Malignant tumor	6	24.0
Culture results		
Positive (<i>Aspergillus niger</i>)	3	12.0
Negative	22	88.0
Surgical approach		
FESS	20	80.0
Endoscopic excision with skull base reconstruction	3	12.0
FESS with abscess drainage	1	4.0
Marsupialization	1	4.0
Recurrence and outcome		
Recurrence 12 months after surgery	2	8.0
Recurrence 6 months after surgery	1	4.0
No recurrence	17	68.0
Expired	3	12.0
Lost to follow-up	2	8.0

DISCUSSION

UNM's can be a common presentation among adults but are often considered as an ominous display of a more serious underlying pathology in pediatric patients. Because of the considerable diversity in the underlying

etiologies of UNM in the young, it demands a precise identification and confirmation through history, physical examination and several diagnostic modalities.

In this study, we found out that patients with UNM can present from nasal obstruction to headache, and even facial/ nasal swelling/ pain, epistaxis and many more. Almost half of our patients presented with nasal obstruction which is concordant to findings from previous studies.^{7,8} The causes for the nasal obstruction are brought about by the enlargement of nasal masses and lesions that have grown in the area (nasal ala or other structures of the nose) or by direct extension from the nasopharynx and other adjacent structures particularly in children.¹⁴

The underlying pathology is often diagnosed by otorhinolaryngologists through direct visualization using fiberoptic scopes with consequent histopathological diagnosis and confirmation of the condition. In most of the cases of UNM's, the underlying pathology is benign and inflammatory in nature up to 83% of cases.^{8,9} Some studies even reported a higher prevalence of benign histopathological diagnosis of UNM's of 95.9%.¹⁵ Our study showed 76.0% benign, and the remaining 24.0% were malignant.

The two cases which came out unremarkable with FNE were a case of right meningocele and a case of orbital osteoma, which both presented as nasal obstruction. Probably, the FNE was not able to assess the extent of the lesion since there were cases wherein a combined external and endoscopic approach to assess the size and extensions of meningocele, encephalocele and anterior skull base effects.¹⁶ The use and selection of imaging modality particularly in the pediatric population should be carefully considered because of the potential risk of carcinogenesis from ionizing radiation.¹⁴

In this study, we found that the propensity of having a malignant condition among patients presenting with a UNM is 24% (6 patients), which resulted into death of three patients. Our rate is significantly higher than the 17% reported in two studies conducted by Yaman et al and Nair et al.^{8,9} This proves the varying differences in the diagnosis of pediatric patients that presents with an UNM, thus warrants a histologic diagnosis.^{2,6,8} Because of this, the importance of clinico-histopathologic and radiologic investigation of patients presenting with an UNM is very essential, not only for the diagnosis of the condition, but for the appropriate management and prognosis of the patient.

The limitation of the study was its small sample size. The main reason was because of the rarity of patients that came to our institution presenting as UNM in a period of 4 years. However, despite the small sample size, we were able to show and deduce some information on the clinico-histopathological and radiological features of patients. Furthermore, this denotes that the risk of having a

malignant condition with UNMs should not be overlooked. Furthermore, this study also showed and highlighted that a neoplastic disease can occur even among the pediatric population and may present with varied symptoms that may seemed unlikely for a malignant process.

CONCLUSION

Pediatric patients with a UNM may present with varied symptoms. Nasal endoscopic diagnosis may show unremarkable results particularly among conditions like meningocele and osteoma. However, a histopathologic diagnosis is warranted to confirm the diagnosis since the propensity of having a malignant process is very possible to as much as 24%. A larger similar study is needed to confirm our findings.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Review Board (IRB) of KFSH, Dammam, Saudi Arabia

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