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Sinonasal masses: modalities, clinical presentation, and management in Sudan

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Abstract

Background Sinonasal masses are not an uncommon spectrum of diseases. They are frequently encountered in Sudan, sometimes with variability in modalities across the country. The objective of this study is to document the pattern of sinonasal masses in Sudanese patients and to highlight the knowledge of the modalities, clinical presentations, and management. As a consequence, this will raise awareness especially of the general practitioners and family physicians and hence the community locally and regionally. Early diagnosis and appropriate management can reduce the rate of recurrence, fatal complications, and hence morbidity and mortality.

Methods This is a prospective descriptive, comparative hospital-based study conducted from January 2020 to January 2021. All patients with sinonasal masses, who came to Khartoum ENT Teaching Hospital seeking medical advice during the above-mentioned period were included in the study provided they satisfy the inclusion criteria. Enrollment was optional with the right to withdraw at any time. Consent was verbal with the reassurance about the aspect of confidentiality, privacy, and consent of the data. Ethical clearance was obtained from the ethical committee (EDC) SMSB and from the research committee of Khartoum teaching hospital. Analysis was done using a computer and the statistical package of social sciences SPSS V.25

Results A total number of 244 patients were studied. The age group of 21–40 years was the most encountered with the disease (42.6%). Two hundred three patients (83%) had a non-neoplastic disease, (9%) benign neoplastic lesions, and (8%) malignant neoplastic lesions. The non-neoplastic group was dominated by nasal polyposis of which the fungal were the most common (50%). Among benign neoplastic lesions, pyogenic granuloma ranked first (24%). Among malignant neoplastic lesions, squamous cell carcinoma dominated the epithelial origin lesions (71%) and Rhabdomyosarcoma dominated the connective tissue cell types (50%). Nasal obstruction is the most common complaint (94.7%) followed by nasal discharge (64.8%) then anosmia (53.3%). Endoscopic surgery was done in (84.4%) of patients, combined approach endoscopic and open surgery in (5.3%) while open surgery alone was done in 2.5%. Radiation and chemotherapy were used in 2% each, while chemo-radiation was used in (2.5%). The rest of the cases (1.3%) were managed by surgery followed by chemoradiation.

Conclusion Patients with sinonasal masses in Sudan especially the age group 21–40 years must be seen in specialized Otolaryngology clinics to pick, diagnose and treat significant diseases in an early stage. Radiology and histopathology are a must in sinonasal swellings to diagnose malignant diseases at an early stage. Nasosinus fungal polyposis being the commonest in non-neoplastic lesions, the commonest among all sinonasal masses added together, and a known reported endemic disease in the country must receive special consideration and investigation for early diagnosis and treatment.

Keywords Sinonasal masses, Pattern, Non-neoplastic, Neoplastic, Fungal polyps, Sudan

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Background

Sino-nasal masses are not an uncommon ailment in ORL practice. The patients commonly present with complaints of nasal obstruction, nasal discharge, epistaxis, or disturbances of smell. Disturbances of vision, proptosis, and deformities of the nasal framework are also possible presentations. The differential diagnosis of Sinonasal masses is variable, they may be congenital, inflammatory, traumatic, allergic, or neoplastic (benign or malignant) [1].

Polyps include allergic, inflammatory, or fungal polyps which are well known for their recurrences. Other benign masses include haemangioma, angiofibroma, mucocoeles and inverted papilloma. Malignant masses in addition to their nasosinus origin may arise or extend into the nose and para-nasal sinuses from the oropharynx or nasopharynx. Certain hematological malignancies may also present as Sino nasal masses [1]. In this study, the modalities, clinical presentation, and management of sinonasal masses in Sudan are discussed.

Methods

This is a prospective, hospital-based observation descriptive, comparative study carried in Khartoum ENT teaching hospital during the period from January 2020 to January 2021. The study targeted all patients with sinonasal masses presenting to the hospital seeking medical advice. Enrollment was optional with the right to withdraw at any time. Consent was verbal with reassurance about the ethical aspects of the confidentiality, privacy, and consent of the data. Ethical clearance was obtained from the ethical committee of (EDC) SMSB and from the research committee of Khartoum ENT teaching hospital. Through a well-structured questionnaire, demographic data, clinical features, and the primary modality of treatment information were recorded. Analysis was done using a computer and Statistical Package for Social Sciences (SPSS) v25.

Results

In this study, two hundred forty-four patients were enrolled, and all of them were managed in Khartoum ENT teaching hospital. Their age ranged from 5 to 72 with a mean age of 38.5 years. The age group of 21–40 years (42.6%) showed the highest percentage followed by 10–20 years (27.5%), 41–60 years (16%), >60 years (9.4%) and the least were <10 years (4.5%).

One hundred twenty-three were males represent 50.4%, and one hundred twenty-one were females represent 49.6% with a M:F ratio of 1.02:1. The common presenting symptoms in order of frequency were nasal obstruction in 231 patients (94.7%), nasal discharge in 158 patients (64.8%), anosmia in 130 patients (53.3%),

Table 1 Number of nasal symptoms with duration among patients with sinonasal masses in Khartoum ENT teaching hospital (study 2020–2021)

	No of pt < 3 months	No of pt 3–6 months	No of pt > 6 months
Epistaxis	15	8	9
Facial pain	17	26	45
Nasal discharge	20	34	104
Nasal obstruction	49	63	119
Anosmia	21	34	75
Cacosmia	5	11	8
Post nasal dripping	16	34	51
Parosmia	3	4	9
headache	23	26	62
Proptosis	18	8	7

Table 2 Clinical diagnosis after histopathology: non-neoplastic masses among patients with sinonasal masses in Khartoum ENT teaching hospital (study 2020–2021)

	Frequency	Percent
None	41	16.8
Allergic polyp	76	31.1
Antrocoanal polyp	19	7.8
Congenital	4	1.6
Fungal polyp	102	41.8
Mucocele	2	0.8
Total	244	100

post nasal dripping in 101 patients (41.4%), facial pain 88 patients (36.1%), epistaxis 32 patients (13.1%), and cacosmia in 24 patients (9.8%). Other presenting symptoms included: headache in 111 patients (45%), proptosis 33 patients (13.5%), cranial neuropathy 4 patients (1.6%), and diplopia 3 patients (1.2%).

Unilateral symptoms were more common (75%) while bilateral symptoms were present in 25%. The duration of symptoms was up to six months in more than 50% of cases (Table 1).

Clinical diagnosis after histopathology showed non-neoplastic mass in 203 patients (83%); fungal associated polyps 102 patients (41.8%) allergic polyps 76 patients (31.1%), antrocoanal polyps 19 patients (7.8%), congenital cyst 4 patients (1.6%), and mucocele 2 patients (0.8%) (Table 2).

Benign neoplastic mass in 21 patients (8.5%): pyogenic granuloma 5 patients (2%), angiofibroma 4 patients (1.6%), inverted papilloma 4 patients (1.6%), fibrous dysplasia 4 patients (1.6%), ossifying fibroma 2 patients (0.8%), and dentigerous cyst 2 patients (0.8%) (Table 3).

Table 3 Clinical diagnosis after histopathology: benign neoplastic masses among patients with sinonasal masses in Khartoum ENT hospital (study 2020–2021)

	N	%
None	223	91.4
Angiofibroma	4	1.6
Dentigerous cyst	2	0.8
Fibrous dysplasia	4	1.6
Inverted papilloma	4	1.6
Ossifying fibroma	2	0.8
Pyogenic granuloma	5	2.0
Total	244	100.0

Malignant neoplastic (epithelial) mass in 14 patients (6%): SCC 10 patients (4.1%), adenoid cystic carcinoma 2 patients (1.6%), malignant melanoma 2 patients (1.6%). Malignant neoplastic (connective tissue) in 6 patients (2.5%): rhabdomyosarcoma 3 patients (1.2%), lymphoma 2 patients (0.8%), and haemangiopericytoma 1 patient (0.4) (Table 4).

As for treatment modalities, endoscopic surgery was at the top of the list (84.4%), combined approach (endoscopic + open surgery) (5.3%) and open surgery (2.5%), chemoradiation (2.5%), chemotherapy (2%), radiotherapy (2%), and chemoradiation + surgery (1.3%) (Table 5).

Discussion

Analysis of the clinical and demographic data of 244 patients with sinonasal masses in this study shows that the nose is a home for a variable spectrum of diseases some of which carry significant morbidity. The nose and paranasal sinuses are the origin of sinonasal masses but in addition, lesions may originate from the nasopharynx or oropharynx. The ages affected covered a wide range from 5-72 years with a mean age of 38. Males and

Table 4 Clinical diagnosis after histopathology: malignant neoplastic masses among patients with sinonasal masses in Khartoum ENT teaching hospital (study 2020–2021).

Histopathology		N	%
Epithelial	None	230	94.3
	Malignant melanoma	2	0.8
	Adenoid cystic CA	2	0.8
	SCC	10	4.1
Total		244	100.0
Connective tissue	None	238	97.5
	Lymphoma	2	0.8
	Haemangiopericytoma	1	0.4
	Rhabdomyosarcoma	3	1.2
Total		244	100.0

Table 5 Treatment modalities among patients with sinonasal masses in Khartoum ENT teaching hospital (study 2020–2021)

Treatment modality		n	%
Surgical	Endoscopic	206	84.4
	Combined	13	5.3
	Open	6	2.5
Non-surgical	Chemoradiotherapy	6	2.5
	Chemotherapy	5	2.0
	Radiation	5	2.0
Both	Surgery + chemoradiation	3	1.3
Total		244	100

females were affected almost with equal percentages, ratio 1.02:1. In contrast with some other studies which suggested males predominance [2–4]. Among the nasal and paranasal sinuses masses there were (83%) of non-neoplastic nature. This is consistent with several studies [2–4]. Further in our study, benign neoplasms were 9% and malignant neoplasms were 8%. There is agreement and disagreement from Indian studies [5–7]. Those who disagreed suggested 7.7% non-neoplastic, 72% benign neoplasms, and 21% malignant neoplasms. This is a great difference, but these are reports from a different continents. In our study our histopathology reports especially in squamous cell carcinomas and rhabdomyosarcomas, the radiology added the confirmation and differentiation between the benign and malignant lesions showing very clearly the expansion in the benign and the destruction in the malignancy. A wide range of age groups was affected with variation in the type of masses. Fungal-associated polyps were the commonest non-neoplastic sinonasal masses mostly in ages 21-40. The diagnosis is confirmed by histopathology, hematoxylyn and eosin stain (Hand E) and Periodic Acid-Schiff (PAS) revealed dense eosinophilic rounded fungal rod structures in the center of granuloma. Further confirmation was done by culture and immunodiagnosis. Others suggested inflammatory polyps to be the commonest [2, 7, 8]. As for the reason why fungal polyps are common in Sudan, this is because the disease is endemic in the country. This is documented by previous studies [9]. Non-neoplastic masses being common in ages 11–30 years is reported from India [4]. Other types of polyps were allergic polyps and antro-coanal polyps. Pyogenic granuloma is the most common among benign neoplastic lesions then angiofibroma, fibrous dysplasia, inverted papilloma, and ossifying fibroma in descending order. Squamous cell carcinoma is the most common malignant epithelial lesion. This is consistent with several studies [2–4, 10–12]. Adenoid

cystic carcinoma followed. Rhabdomyosarcoma is the most common type of malignant connective tissue lesion, this is consistent with similar reports [2, 4, 13, 14]. Lymphoma and haemangiopericytoma followed. Rhabdomyosarcoma occurred in ages 10–20 years and inverted papilloma and squamous cell carcinoma in up to 60 years of age. Variation in age limit was reported [15].

Symptomatology revealed nasal obstruction was the most common complaint followed by nasal discharge then anosmia, headaches and proptosis. This is consistent with several studies [1, 5, 6, 11, 16]. Unilateral presentation and symptoms formed (75%) of patients, similar studies agreed [1, 5]. Up to half of the patients came with a duration of symptoms of more than 6 months, which agrees with a Nigerian study [2]. About 20% of patients have histories of previous endoscopic surgery which may affect the duration of the presenting symptoms. Septal deviation was seen in almost one-third of patients, it could possibly be a result of the disease, or it could be an aggravating factor in others. Most of our sinonasal masses were related to the lateral wall of the nasal cavity. This varied with the clinical presentation [15].

Some of the allergic polyps and an appreciable number of the fungal polyps and malignant neoplasms were associated with bone erosion. Bone erosion is a known feature of malignancy but occurs with the invasive type of nasosinus fungal disease. The majority of our patients (92.1%) were managed by surgery: endoscopic sinus surgery (ESS) 84.4%, combined ESS and open surgery 5.3%, and open surgery 2.5%. In addition, 1.3% were treated with combined surgery and chemoradiation. This agrees with the trend nowadays [14]. Chemotherapy alone and radiotherapy as for the treatment basically the tools are the same, it only differs in the pattern of placement accordingly to the clinical presentation and regimen adopted in each center [17–21]. To our knowledge and after a computerized literature search this is the first communication to target and highlight the trend of sinonasal masses in Sudan. The non-neoplastic masses are the commonest. Among these, nasal polyposis predominates with fungal nasal polyposis being the commonest pathology. In addition, fungal sinonasal polyposis stands as the commonest among all sinonasal masses added together.

Conclusion

Patients with sinonasal masses in Sudan especially the age group 21–40 years, being the most affected, must be seen in specialized ORL clinics to pick, diagnose and treat significant diseases in an early stage. Radiology

and histopathology are a must in sinonasal swellings to diagnose malignant diseases, at an early stage. Nasosinus fungal polyposis being the commonest non-neoplastic lesion, the commonest among all sinonasal masses added together, and a known reported endemic disease in the country must receive special consideration and investigation for early diagnosis and treatment.

Abbreviations

ORL	Otolaryngology
ENT	Ear nose and throat
ESS	Endoscopic sinus surgery
SCC	Squamous cell carcinoma
SPSS	Statistical Package for Social Sciences
SMSB	Sudan Medical Specialization Board
EDC	Educational Development Center

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Authors' contributions

OMK made substantial contributions in the conception, design, analysis, interpretation of the data, and manuscript drafting. MEMH made a substantial contribution in the conception, design, analysis, interpretation of the data, and manuscript drafting. MESA made a substantial contribution in the conception design, interpretation of the data, and reviewing the manuscript draft. HIY made substantial contributions in the interpretation of the data, revision, and editing of the manuscript draft. The authors read and approved the final manuscript.

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Availability of data and materials

All relevant data and methodological details pertaining to this study are available to interested researchers upon reasonable request to the corresponding author.

Declarations

Ethics approval and consent to participate

Before initiating this study, the objectives of ethics in research were ensured by obtaining ethical clearance from the research committee (EDC) SMSB. Permission was obtained from the administrative authorities otolaryngology departments Khartoum state. Oral informed consent was obtained from the study participants after assuring them of the ethical aspects regarding the confidentiality, privacy, and consent of the data. Participation is voluntary, with the right of withdrawal at any stage.

Consent for publication

Not applicable.

Competing interests

The authors declare they have no competing interests.

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References

1. Pritam C, Sharma P, Khanna S (2014) A clinicopathological and radiological study of sinonasal mass. *Indian J Med Res Pharmaceut Sci* 1(5):21–26
2. Shuaibu I, Yunusa; Usman, Muhammed Aminu; Ajiya, Abdulrazak. (2020) Unilateral sinonasal masses: Review of clinical presentation and outcome in Ahmadu Bello university teaching hospital, Zaria, Nigeria. *Niger Med J* 61(1):16
3. Garg D, Mathur K (2014) Clinico-pathological study of space occupying lesions of nasal cavity, paranasal sinuses and nasopharynx. *J Clin Diagnost Res* 8(11):FC04
4. Bhattacharya J et al (2015) A clinicopathological study of masses arising from sinonasal tract and nasopharynx in north Bengal population with special reference to neoplasms. *Egypt J Otolaryngol* 31(2):98–104
5. Shirazi N et al (2015) Spectrum of sinonasal tumors: a 10-year experience at a tertiary care hospital in North India. *Oman Med J* 30(6):435
6. Agarwal P, Panigrahi R (2017) Sinonasal Mass—a Recent Study of Its Clinicopathological Profile. *Indian J Surg Oncol* 8(2):123–127
7. Singh SG et al (2018) Presentation of lesions of nose and paranasal sinuses at a tertiary care center in central India. *Indian J Otolaryngol Head Neck Surg* 70(2):284–289
8. Belli S et al (2018) Single-sided sinonasal mass: A retrospective study. *Northern Clin Istanbul* 5(2):139
9. Yagi HI et al (1999) Nasosinus aspergillosis in Sudanese patients, clinical features, pathology, diagnosis, and treatment. *J Otolaryngol (J Otolaryngology)* 28(2):90–94
10. Sivalingam J et al (2015) Sinonasal neoplasia—clinicopathological profile and importance of computed tomography. *J Clin Diagnost Res* 9(6):TC01
11. Mahalingappa YB, Khalil HS (2014) Sinonasal malignancy: presentation and outcomes. *J Laryngol Otol* 134(7):654
12. Danesh-Sani S-A et al (2016) Paranasal sinuses malignancies: A 12-year review of clinical characteristics. *Med Oral Patol Oral Cirurgia Bucal* 21(5):e626
13. Gerth DJ, Tashiro J, Thaller SR (2014) Pediatric sinonasal tumors in the United States: incidence and outcomes. *J Surg Res* 190(1):214–220
14. Ali M, Nabil M, Safa N, Hela D, Sameh M, Cyrine Z, Ghassen C, Rania BM, Khemaies A, Sonia B (2015) Diagnosis and management of benign tumors of nasal and paranasal sinuses: 31 cases. *The Egyptian. J Otolaryngol* 31:4–9
15. Kelles M et al (2014) Antrochoanal polyp: clinical presentation and retrospective comparison of endoscopic sinus surgery and endoscopic sinus surgery plus mini-Caldwell surgical procedures. *J Craniofacial Surg* 25(5):1779–1781
16. Llorente JL et al (2014) Sinonasal carcinoma: clinical, pathological, genetic and therapeutic advances. *Nature Reviews. Clin Oncol* 11(8):460
17. Michel J et al (2014) Sinonasal squamous cell carcinomas: clinical outcomes and predictive factors. *Int J Oral Maxillofac Surg* 43(1):1–6
18. Gohar M, Shahid; Niazi, Saleem Asif; Niazi, Sohail Baber. (2017) Functional Endoscopic Sinus Surgery as a primary modality of treatment for primary and recurrent nasal polyposis. *Pak J Med Sci* 33(2):380
19. Saedi B et al (2014) Surgical outcomes of malignant sinonasal tumors: open versus endoscopic surgical approaches. *J Laryngol Otol* 128(9):784–790
20. Lund VJ, WEI, William I. (2015) Endoscopic surgery for malignant sinonasal tumors: an eighteen-year experience. *Rhinology* 53(3):204–211
21. Gotlib T et al (2014) Endoscopic transnasal management of sinonasal malignancies—our initial experience. Video surgery and Other Mini invasive. *Techniques* 9(2):131

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