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Clinicopathological study and management of masses in the sinonasal cavity and nasopharynx: a case series of 42 cases

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Abstract

Background Different types of space-occupying lesions can arise from the nasal cavity and nasopharynx. They can be neoplastic (benign and malignant) or nonneoplastic lesions producing wide range of clinical symptoms. The correlations of clinical, radiological and histopathological findings are necessary in these types of cases.

The aim of the study is to evaluate clinical behaviours of sinonasal cavity and nasopharyngeal masses, to correlate the radiological and pathological findings of masses, to evaluate the methods for early diagnosis of masses and to determine and evaluate the outcome of sinonasal cavity and nasopharyngeal masses following various modalities of treatment.

Materials and methods This was a prospective study conducted in a tertiary care hospital of Vadodara, Gujarat. A total 42 cases were included in the study. Clinical, demographic, radiological and histopathological details were noted in each case. Follow-up period was about 3 months to 18 months in the study.

Observation A total 42 cases were included in the study with 20 benign neoplastic lesions, 19 malignant lesions, and 3 nonneoplastic lesions. The incidence was noted between 8 and 75 years of age with a male to female ratio of 2:23. Angiofibroma was the most common benign neoplastic lesion. Squamous cell carcinoma was the most common malignant lesion noted. Thirty-three patients were successfully operated for the excision of tumour. The most common symptom was nasal obstruction present in 66.67% of cases followed by swelling over local site in 62% of cases followed by nasal discharge in our study.

Discussion The nasal cavity contains different types of epithelial (squamous, neural, olfactory) and mesenchymal (bone, cartilage, muscle and vascular) tissues. Tumours can arise from any of these tissues. Symptomatology is indistinguishable from nasal polypi, chronic rhinosinusitis and granulomatous diseases of the nose. Utmost care is needed in the examination and diagnosis of these cases before starting the treatment.

Conclusion Clinical, radiological and histopathological correlations are necessary in sinonasal masses as it will be helpful in deciding the treatment plan and any adjunctive treatment if necessary like chemoradiation in malignant lesions. Continuous follow-up is also necessary to look for patency of nasal cavity, any complication and recurrence.

Keywords Tumour, Histopathology, Radiology, Benign, Malignant, Sinonasal mass

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Background

The nose is the most prominent part of the face. The external nose and nasal cavity have high aesthetic and functional significance. The nasal cavity contains different kinds of tissues such as the epithelial (squamous, neuroendocrine and olfactory) and mesenchymal (bone, cartilage, muscle, vascular). All of these may carry the risk for a variety of tumour differentiation. Exposure to industrial fumes, wood dust, nickel refining process and leather tanning have been implicated in the carcinogenesis of certain types of sinonasal malignant tumours [1, 2]. Primary nasal malignancies consist of 0.2 to 0.8% of all malignant tumours and 3.6% of malignant upper airway tumours [3]. These tumours usually present with wide range of clinical symptoms and signs. The symptoms of these lesions can be the same as symptoms of chronic rhinosinusitis, nasal polyposis, deviated nasal septum and granulomatous diseases of the nose. These lesions can be misdiagnosed if not looked thoroughly. Patients also ignore these symptoms as simple rhinitis and tumour can reach the size from where only palliative care is possible.

Masses in the sinonasal cavity and nasopharynx may be neoplastic or non-neoplastic. Neoplastic lesions may be benign or malignant. The masses produce a wide range of clinical features ranging from nasal obstruction, epistaxis and nasal pain to destruction of local structures. Inflammation of local tissue produced by these masses may bring changes in local anatomy and physiology. The presenting symptoms of all masses either benign or malignant are almost similar, and hence a thorough clinical examination becomes necessary for accurate diagnosis as early as possible. Accurate diagnosis of tumour and their extent is necessary before planning for surgery. CT scan, MRI, PET scan, nasal endoscopy and biopsy are helpful in the diagnosis of these tumours. The goal of clinicopathological study and management of masses in sinonasal cavity and nasopharynx is to remove all pathological masses and relieve the obstruction in nasal cavity. This study is primarily focused on the evaluation of clinical behaviour, histopathological study and treatment of masses in sinonasal cavity and nasopharynx, so as to avoid recurrence and increase the patient's quality of life.

Treatment options are surgical resection of the tumour with safety margins and postoperative chemotherapy or radiotherapy if needed. In recent era, excision of the nose and paranasal sinus masses can be done through endoscopic approach up to the ventral skull base. The direct endoscopic approach up to the skull base is a minimally invasive, relatively new approach allowing improved visualisation, angled view and a wider panoramic perspective of the important anatomic relationships of nasal cavity structures, while obviating the need for facial incisions, craniotomy and brain retraction.

Methods

This study was conducted in a tertiary care hospital of Vadodara district in Gujarat, India, from January 2015 to June 2016. This study was a prospective study with 42 cases. All the cases with nasal masses, attending outpatient department, inpatient department or emergency department were included. The patients with adenoid enlargement and sinonasal polyposis were excluded from the study.

All the patients were assessed in detail by their demographic profile, clinical presentations, and investigations and by treatment plans provided. Nasal endoscopy, CT scan and MRI were done to know the type, extent and vascularity of the lesions. Preoperative biopsy was taken for histological diagnosis before starting the treatment in necessary cases. Patients were treated by external and/or endoscopic excision of the tumours. Malignant cases were advised for postoperative chemotherapy and radiotherapy. Patients were followed up to 3 to 18 months for nasal cavity examination and to check for residual or recurrent lesion.

Results

In our study, the most common age group was from 51 to 60 years of age (21%). The youngest patient was of 8, and the oldest patient was of 75 years of age. Benign lesions were more common in the younger age group, and malignant lesions were more common between 45 and 60 years of age.

Out of 42, 29 patients (69%) were males, and 13 patients (31%) were females. Thirty-five patients had unilateral mass, and 4 patients had bilateral involvement. Three patients had lesion over the tip and dorsum of the nose.

The most common symptom was nasal obstruction in 28 patients (66.67%), followed by swelling over nose and PNS area in 26 patients (62%), nasal bleeding in 21 (50%), nasal discharge in 16 (38%) and local pain or headache in 14 patients (33%). Olfactory disturbance was present in 6 patients. Oral and ear complaints were present in 5 and 2 patients respectively. Fifteen patients had developed hyponasality of speech.

The most common clinical presentation was nasal mass in 30 (71%) patients followed by facial swelling in 12 (28.6%) and palatal and orbital involvement in 9 patients (21%) each. Skin infiltration was present in 8 patients (19%). Orbital involvement was found in the form of movement restriction (7%), proptosis (4.7%), dacryocystitis (4.7%) and engulfment of the eyeball by the tumour (4.7%).

In our study, 22 patients (52%) had symptoms for a duration of less than 3 months. Fourteen patients had

symptoms for a duration of 3 to 6 months. Six patients came after 7 months of starting of the symptoms.

Tumour size distribution was done according to the CT scan and postoperative specimen's gross examination. The most common size was from 6 to 10 cm of lesion in 16 patients (38%), followed by 3–5 cm in 15 patients (35.7%). Thirteen lesions were moderately enhancing, and 11 lesions had heterogenous enhancement over CT scan. Two lesions had intense enhancement.

The most common structure involved was the nasal cavity proper in 31 patients (73.8%) followed by maxillary sinus in 24 patients (57.1%), turbinates in 21 (50%), ethmoid sinuses in 20 (47.6%), nasopharynx in 14 (33.33%), sphenoid sinus in 13 (31%), nasal septum in 11 (26%) and frontal sinus in 7 patients (16.6%).

Orbital cavity involvement was present in 18 patients (42.8%), followed by pterygopalatine fossa in 11 (26.1%), skull base in 9 (21.4%), infratemporal fossa in 6 (14.2%) and intracranial involvement in 4 patients (9.5%).

Most common site of origin was the maxillary sinus (23%) followed by the nasal septum (19%), sphenoid sinus (16%), lateral wall (14%), ethmoid sinus (9%), nasopharynx and tip of nose (7%).

A total 33 out of 42 patients were operated for excision of the mass. Twenty nasal masses (17 benign and 3 malignant) were endoscopically excised. Twelve masses (6 benign and 6 malignant) were excised via external approaches. One patient of malignant melanoma had combined approach for excision of the mass.

Two patients had intraoperative dural damage. One patient of malignant melanoma developed CSF leak which was repaired intraoperatively. Eleven patients had required intraoperative or postoperative blood transfusion.

Postoperative complications were noted like crusting in 24 patients (70%), local pain in 11 (32%), synechia in 6 patients (17%), scar in 4 patients (10%) and dacryocystitis and nasal bleeding in 2 patients each (5%). All the patients were successfully treated for their complications.

Graphical distribution of benign and malignant lesions is given below. Three nonneoplastic lesions were radicular cyst, rhinosporidiosis and hair cell naevus, each having 1 case.

All cases of benign lesions and nonneoplastic lesions were followed up to 7 months to 18 months. There was no recurrence noted.

For malignant lesions, 7 patients (36.7%) had completed the necessary treatment protocol and are disease free at present. Ten patients with malignant lesions died during the treatment period due to extensive involvement. Two patients were lost to follow-up.

Discussion

The nasal cavity contains different types of epithelial (squamous, neural, olfactory) and mesenchymal (bone, cartilage, muscle and vascular) tissues. Tumours can arise from any of these tissues, and these tumours can produce a wide range of symptoms and signs in different patients. Accurate histopathological diagnosis and their treatment is of utmost necessity in these cases.

In our study, the mean age for benign lesions and malignant lesions was 34.69 and 48 years respectively. In a study by Khan et al., the mean age for benign lesions was 26.8 years, and for malignant lesions, it was 35.3 years [4]. The most affected age group was 41–50 years (29.4%), and the least number of cases was seen in 0–10 years (2.9%) seen in a study by Agarwal et al. [5]. Benign lesions are usually more common in younger age from 11 to 20 years as nasopharyngeal angiofibroma was more common in adult age in our study. As per Alope Bose Majumdar et al., non-neoplastic nasal masses were the commonest in the 2nd to 4th decade of life [6].

The male to female ratio was 2:23 in our study as compared to 2:3 in Khan et al., 1:54 in A. Lathi et al. and 1:8 in S.S. Bist et al. [4, 7, 8]. Thus, in most of the studies, males were more commonly affected than females. The male to female ratio for non-neoplastic lesions was 1.7:1 in a study by Harshad et al. [9] and 1.2:1 by Janice et al. [10].

The most common symptom was nasal obstruction present in 66.67% of cases which was also present in other studies. The second symptom was swelling over the local site in 62% cases followed by nasal discharge in our study. In a study by S.S. Bist et al., the most common symptom was nasal obstruction in 87.27% followed by nasal discharge in 69.09% and headache in 60.9% patients [8]. Thus, nasal obstruction was the most common symptom noted in other studies also, but the frequency can be varied.

Symptomatology revealed that nasal obstruction was the most common complaint followed by nasal discharge and swelling, then anosmia, headaches and proptosis. This is consistent with several studies [5, 11–13].

Orbital involvement was seen in 21% of cases in our study. In other studies, it was 10.7% and 17% [4, 7]. More involvement in our study was because we had not included the cases having sinonasal polyposis. Oral cavity involvement was seen in 9 patients in the form of ulcer or swelling. In other study, 11 patients had oral cavity involvement out of 110 patients (Fig. 1) [8].

Proptosis was seen in 4.76% cases in our study. In other study, it was present in 10% of cases. Loss of vision and movement restriction was present in 7.14% cases each as compared to 4.5% in other studies. Dacryocystitis was present in 4.7% of cases in our study [8].



Fig. 1 Right maxillary sinus schwannoma with upward displacement of the eyeball with restricted movement in a 34-year-old female

Fifty-three percent of patients had approached the hospital for the symptoms in our study in less than 3 months. Early presentation was due to the presence of symptoms like swelling over the face and nasal bleeding in malignant conditions. In one study, 28% patients had presented after the 1 year of symptoms. This is because of ignorance of symptoms like nasal discharge, headache and nasal obstruction which were also more commonly seen in sinonasal polyposis. In a Nigerian study, more than half of the patients came after 6 months of symptom duration [14].

The left nasal cavity (45.2%) was more commonly involved than the right nasal cavity (38%) in our study. The left nasal cavity was more commonly involved in 37.27% than the right nasal cavity (29%) in other study. 25.45% of cases had bilateral presentation in the study [8]. In our study, this was only 9.5% as there was non-inclusion of sinonasal polyposis.

Diagnostic nasal endoscopy was done in all patients in our study. DNE is a useful investigation to diagnose the lesion, to take biopsy and to measure the size of the lesion and its extent. It is also very useful in determining the treatment plan. It also helps in early diagnosis in suspected cases with nasal symptoms. Anterior rhinoscopy

BENIGN LESIONS TOTAL CASES: 20

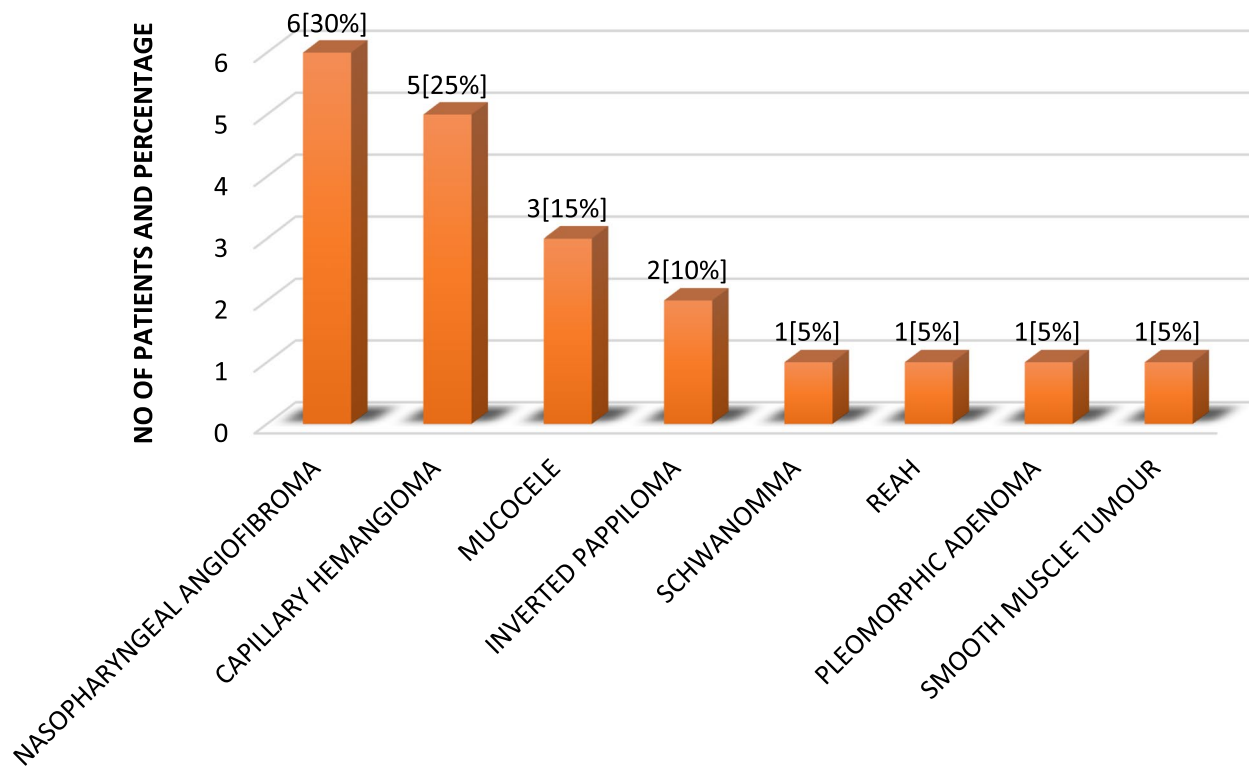


Fig. 2 Benign lesions and their percentage



Fig. 3 Septal haemangioma in a 24-year-old male

was able to detect 70% of nasal masses in our study. In one study, 50 and 13 cases out of 110 were diagnosed to have nasal mass on anterior and posterior rhinoscopy respectively [8].

CT scan was done in 33 out of 42 patients. Out of 33, 12 patients also underwent MRI for orbital and intracranial involvement. CT scan had difficulty in the interpretation between thick secretion, tissue oedema and the tumour itself. MRI can delineate between these two

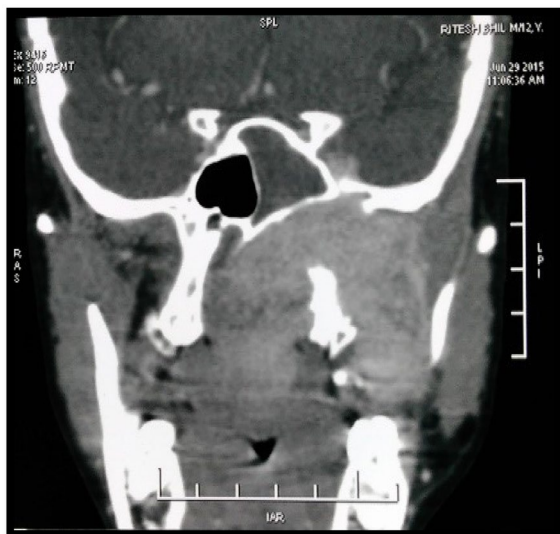


Fig. 4 Dumbbell-shaped angiofibroma involving the pterygopalatine and infratemporal fossa in a 12-year-old male

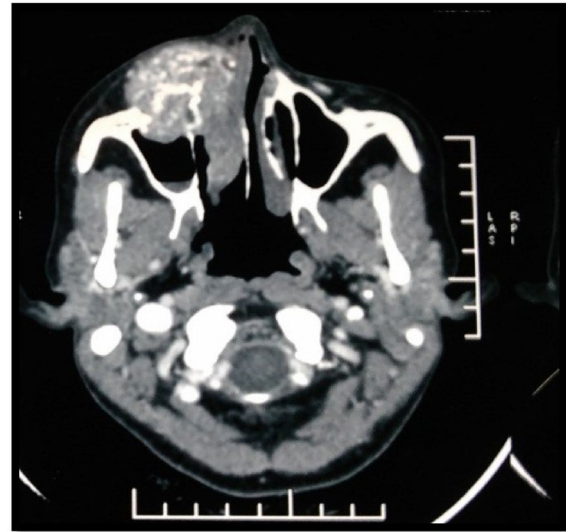


Fig. 5 Adenoid cystic carcinoma in a 25-year-old female in the right maxillary sinus

and is helpful in the exact size measurement and stage determination of the tumour. Bony erosion was present in 66.67% of cases in our study. In other studies, it was around 28.2% [8].

Histopathological diagnosis was done in all cases. Twenty patients (47.6%) had benign neoplastic, and 19 patients (45.23%) had malignant lesions (Fig. 2).

Angiofibroma was the most common benign lesion comprising 30% of the cases. In study by S.S. Bist et al., 38% cases had angiofibroma as being the most common



Fig. 6 NKT cell lymphoma with hard palate, floor and septum necrosis in a 12-year-old male

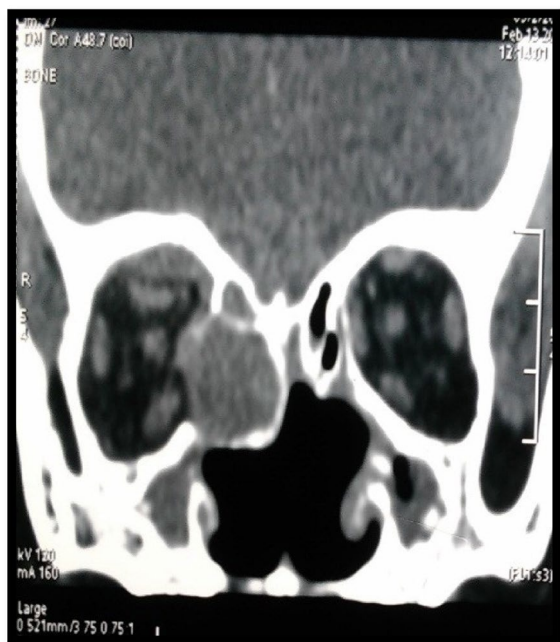


Fig. 7 Anterior ethmoidal mucocoele with orbital abscess in a 23-year-old female

lesion [8]. Capillary haemangioma was the 2nd most common in our study. A. Lathi et al. and Aparna et al. had 9 cases (47.3%) and 5 cases (38.46%) respectively, being the most common in their study [7, 15]. In a study by Manya Thakur et al., inverted papilloma was

the most common benign neoplastic lesion followed by angiofibroma and haemangioma (Fig. 3) [16].

There were 2 cases of inverted papilloma comprising 10%. Dinesh Garg et al. had 5 cases (45.46%) with the most common lesion in their study [17]. Inverted papilloma has a high tendency of up to 21.4% to convert into squamous cell carcinoma [18]. A bigger sample size is necessary to know the exact conversion rate.

There was one case of schwannoma in our study. Aparna et al. and Dinesh Garg et al. had 1 and 2 cases in their study (Fig. 4) [15, 17].

Squamous cell carcinoma was the most common malignant lesion with 6 cases (31.57%) differentiated into basisquamous, undifferentiated and epithelial carcinoma. SCC was also most common in other studies comprising 33.33% by S.S. Bist et al. and 66.67% by Aparna et al. [8, 15]. Lymphoma and malignant melanoma were the 2nd and 3rd most common ones, respectively, in our study (Figs. 5, 6, and 7).

Four patients had histological diagnosis which was different than expected from previous clinical, radiological and histopathological findings. This type of difference was noted in 3.63% cases by S.S. Bist et al. and 0.3% Kale et al. [8, 19]. This variation suggests that each and every specimen should be sent for histopathological diagnosis as it can change the treatment plan. This is especially important in malignant lesions (Fig. 8).

Excision of the nasal masses can be done via external and/or endoscopic approach. There are different external approaches like lateral rhinotomy, midfacial degloving,

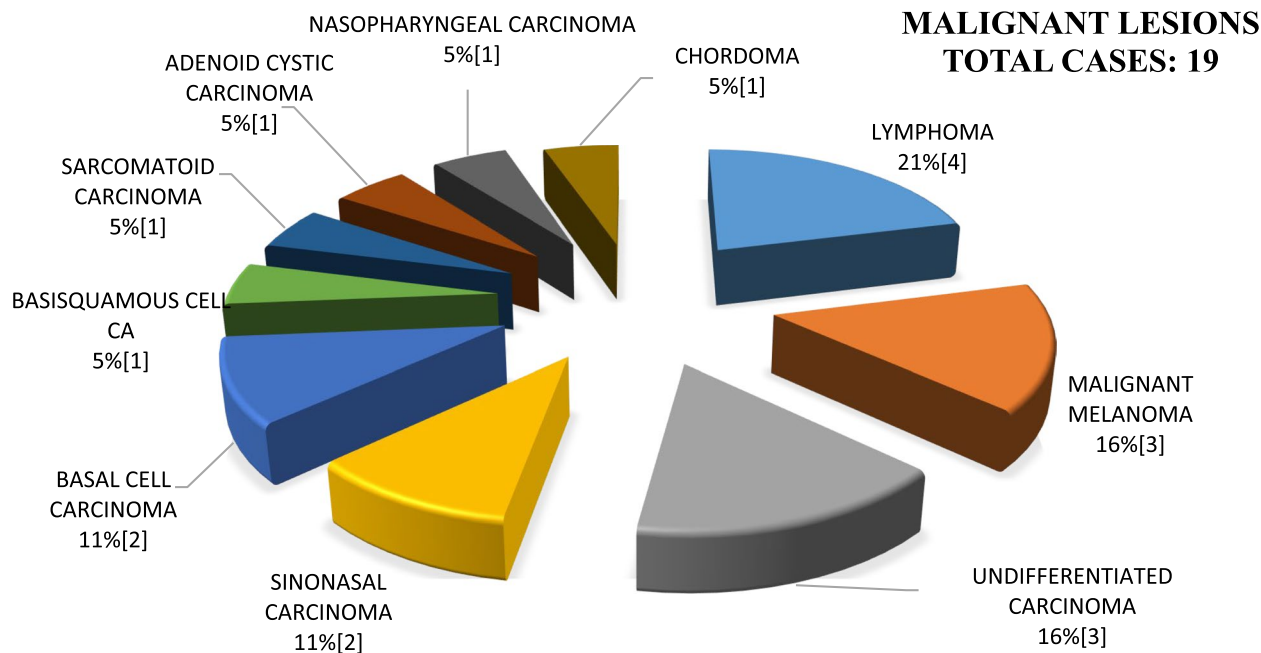


Fig. 8 Malignant lesions and their percentage

craniofacial resection and subcranial approach. Endoscopic approach has gained preference over external approach as it has more advantages like avoidance of scar, low morbidity, less complication and less hospital stay. Nowadays, navigation surgery, robotic surgery, intraoperative CT or MRI and virtual endoscopy have developed a new era in sinonasal surgery.

Conclusion

Masses in the sinonasal cavity and nasopharynx are not an uncommon problem in today's clinical practice. The presenting feature of neoplastic, nonneoplastic and even polyposis is indistinguishable with each other. The correlation of clinical, radiological and histopathological diagnosis is of utmost importance for the accurate diagnosis. Postoperative histopathological examination should be done in all case as it can change the treatment plan especially in malignant lesions. Endoscopic surgical resection is gradually replacing external approaches at many institutions and should be encouraged.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s43163-023-00465-5>.

Additional file 1. Written consent form

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Not applicable.

Authors' contributions

NP and HC analysed and interpreted the patient data regarding the different masses in the nasal cavity. UP performed the histological examination of the specimens and was a major contributor in writing the manuscript. All authors read and approved the final manuscript.

Authors' information

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Availability of data and materials

All data generated or analysed during this study are included in this published article and its supplementary information files.

Declarations

Ethics approval and consent to participate

Approval was obtained from the Ethics and Scientific committee of the Medical College, Baroda. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Ethical approval was obtained on 11/06/2015 with registration no ECR/85/Inst/GJ/2013. Consent to participate in the form of informed and written were obtained from all participants included in the study and from legal guardians if the participants were minor below 16 years old.

Consent for publication

Informed written consent was obtained from all individual participants included in the study. Informed written consent was obtained from legal guardians if the participant was a minor.

The written consent form is shown in Additional file 1.

Competing interests

The authors declare that they have no competing interests.

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