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*Original article*

# Clinicopathological Analysis of Benign tumours of the Sinonasal tract

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## ABSTRACT

**Background:** The nasal cavity and the paranasal sinuses form a single functional unit. Sino nasal tumours are characterized by low incidence, nonspecific symptoms, and late presentation. The sinonasal tumours encompass an entire range of both epithelial and non-epithelial tumours. **Aims & Objectives:** The present study aims to determine incidence, age, sex, site, mode of presentation and histological types of various benign sinonasal tumours over a 5 year period. **Methods:** 93 benign sinonasal tumors biopsied or surgically excised over a period from Janauary 2007 to October 2011 were studied. **Results:** The incidence of benign sinonasal tumors was 0.2%. All age groups were involved with a mean age of 42.5 years. The male to female ratio was 1.7:1. The maximum number of cases was present in the nasal cavity (88%). Inverted papilloma was the commonest benign tumor. The most common mode of presentation was nasal mass. **Conclusion:** The clinical and radiological features of masses of nasal cavity and paranasal sinuses are overlapping and often only a provisional diagnosis is possible. Definite diagnosis requires histopathological examination.

**KEYWORDS:** Nasal cavity, paranasal sinuses, Tumors, Benign

## INTRODUCTION

The nasal cavity and paranasal sinuses including the maxillary, ethmoid, sphenoid and frontal sinuses are collectively referred to as the sinonasal tract [1]. The mucosa of the nasal cavity and paranasal sinuses is often referred to as schneiderian mucosa and certain epithelial lesions are unique to these mucosa eg.schneiderian papillomas of sinonasal tract [2].

The nasal cavity and paranasal sinuses are the site of origin of some of the more complex histologically diverse group of tumors of the entire human body. These include neoplasms derived from mucosal epithelium, seromucinous glands, soft tissues, bone, cartilage, neural/neuroectodermal tissues, hematolymphoid cells and the odontogenic apparatus [3].

Benign tumors of the nasal cavity and paranasal sinuses are rare pathologies with extremely varied etiopathology, clinical behaviour, treatment and prognosis. Clinically it becomes quite impossible to distinguish between inflammatory conditions presenting as simple polyps, polypoidal lesions due to specific disease and benign polypoidal neoplasms with resultant delay of diagnosis. The clinical and radiological features of masses of nasal cavity and Paranasal sinuses are overlapping and often only a provisional diagnosis is possible. Definite diagnosis requires histopathological examination as most of the lesions are inaccessible for fine needle aspiration or FNAC is not recommended because of fear of hemorrhage [4].

## MATERIALS AND METHODS

The surgical specimens received in the Institute of Pathology, Madras Medical College, Chennai from the Upgraded Institute of Otorhinolaryngology, Government General Hospital, Chennai during the period of January 2007 to October 2011 formed the material for this study. Small biopsy specimens and excision biopsy specimens and resection specimens were included. Inadequate or unrepresentative biopsy material was excluded from the study. Informed written consent from the patient was obtained. Institutional ethical committee clearance was obtained. The clinical features such as age and sex of the patient, site of lesion and type of surgery done were noted.

The tissues were routinely processed and paraffin blocks were made and histological sections of 5 to 6 micrometer

were taken in Leica microtome and routinely stained with hematoxylin and eosin stains.The microscopic analyses were done from all the available slides. These included the histological pattern, cellular features, vascularity and secondary changes. Diagnosis was made and the benign tumors were classified. Microphotographs were taken.

**OBSERVATION AND RESULTS**

All Benign tumors of nasal cavity and paranasal sinuses received at the Institute of Pathology, Madras Medical College, Chennai from January 2007 to October 2011 were included in this study. Total of 93 benign tumors were reported with an incidence of 0.2%. Presentation of the tumors was equal in right and left sides (Table-1).

**Table 1**: **Distribution of Benign tumors of Nasal cavity, Paranasal sinuses according to the incidence, sex ratio, age and site of presentation**

| Diagnosis | No. of Cases | % | M:F** | Peak Age (decade) | Nasal Cavity | | PNS* | |
|---|---|---|---|---|---|---|---|---|
| | | | | | No | % | No | % |
| **Benign Tumors** | | | | | | | | |
| Inverted papilloma | 40 | 43.01 | 1.6:1 | 5th and7th | 37 | 45.12 | 3 | 27.27 |
| Hemangioma | 27 | 29.03 | 2:1 | 2nd and 4th | 26 | 31.70 | 1 | 9.09 |
| Hemangiopericytoma | 7 | 7.53 | 2.5:1 | 5th | 5 | 6.09 | 2 | 18.18 |
| Schwannoma | 6 | 6.45 | 1:1 | 4th | 5 | 6.09 | 1 | 9.09 |
| Ossifying Fibroma | 5 | 5.38 | 1.5:1 | 2nd | 3 | 3.65 | 2 | 18.18 |
| Exophytic Papilloma | 3 | 3.23 | M only | 3rd | 3 | 3.65 | | 0 |
| Ameloblastoma | 2 | 2.15 | M only | 4thand5th | 1 | 1.21 | 1 | 9.09 |
| Craniopharyngioma | 1 | 1.08 | M only | 2nd | 1 | 1.21 | | 0 |
| Oncocytic Papilloma | 1 | 1.08 | M only | 3rd | 1 | 1.21 | | 0 |
| Osteoid Osteoma | 1 | 1.08 | M only | 2nd | | 0 | 1 | 9.09 |
| **Total** | **93** | | | | **82** | | **11** | |

*Paranasalsinus, **M-Male,F-Female

It was noted that most patients with benign tumors were in the 5th decade with a mean age of 42.5 years. The male to female ratio was 1.7:1 for benign tumors. Epithelial tumors (44) constitute 47.3% and nonepithelial tumors (49) constitute 52.7% with a ratio of 1:1.11. The age of presentation of individual tumors are variable and the peak age of presentation was 5th decade followed by 3rd (Table 2).

**Table 2**: **Age distribution of benign tumors of Sinonasal tract**

| Age group(years) | Number | Percentage |
|---|---|---|
| <10 | 1 | 1.07 |
| 10 to 20 | 11 | 11.83 |
| 21 to30 | 17 | 18.28 |
| 31 to 40 | 14 | 15.05 |
| 41 to 50 | 21 | 22.58 |
| 51 to 60 | 11 | 11.83 |
| 61 to 70 | 14 | 15.05 |
| 71 to 80 | 3 | 3.23 |
| 81 to 90 | 1 | 1.07 |
| Total | 93 | 100 |

The benign tumors of nasal cavity and paranasal sinuses occurred with variable frequency. Amongst the 93 benign tumors 82 were (88.18%) from the nasal cavity and 11 were from (11.82%) the paranasal sinuses. Maxillary sinus was the commonest site in the paranasal sinuses (Table-4).

**Table 3**: **Sex distribution of benign tumors of Sinonasal tract**

| Sex | Number | Percentage |
|---|---|---|
| **Male** | **59** | **63.44** |
| Female | 34 | 36.56 |
| Total | 93 | 100 |

**Table 4**: **Site distribution of benign tumors of Sinonasal tract**

| Site | Number | Percentage |
|---|---|---|
| **Nasal cavity** | **82** | **88.18** |
| Maxillary sinus | 7 | 7.53 |
| Ethmoid sinus | 2 | 2.15 |
| Frontal sinus | 1 | 1.07 |
| Sphenoid sinus | 1 | 1.07 |
| Total | 93 | 100 |

Of 93 benign tumors the commonest was inverted papilloma constituting 40 cases (43.01%); followed by haemangioma 27 cases (29.03%).The striking variety of the histological types of heterogeneous origin is note worthy. We encountered a variety of tumors such as craniopharyngioma, osteoid osteoma, ameloblastoma, ossifying fibroma, hemangiopericytoma, exophytic papilloma, oncocytic papilloma and schwannoma as shown in table-5.

**Table 5**: **Histological diagnosis of benign tumors of Sinonasal tract**

| Types | Frequency | Percentage |
|---|---|---|
| Ameloblastoma | 2 | 2.15% |
| Hemangioma | 27 | 29.03% |
| Craniopharyngioma | 1 | 1.08% |
| Inverted papilloma | 40 | 43.01% |
| Exophytic Papilloma | 3 | 3.23% |
| Oncocytic Papilloma | 1 | 1.08% |
| Ossifying Fibroma | 5 | 5.38% |
| Osteoid Osteoma | 1 | 1.08% |
| Schwannoma | 6 | 6.45% |
| Hemangiopericytoma | 7 | 7.53% |
| Total | 93 | 100.00% |

## DISCUSSION

The present clinicopathological study of benign sinonasal tumors includes 93 tumors of nasal cavity and paranasal sinuses from January 2007 to October 2011.During the above period 44730 specimens were received at the general surgical pathology laboratory of our institute with an incidence of benign sinonasal tumors representing 0.2%.The rare nature of the tumors is almost a universal finding [5]. All the cases were classified according to WHO Head and neck tumors-2005.Among benign tumors nonepithelial tumors 49 predominated over 44 epithelial tumors. Male to female ratio was 3:1similar to other studies [6] .Age range was 10 to 90 years with an average of 42.5 years.

The maximum number of cases were present in nasal cavity (88.18%) followed by paranasal sinuses (11.82%).Among the paranasal sinuses maxillary sinus was the commonest site of presentation. Mass in the nose was the most common clinical presentation. Tumors involved with equal frequency (50%) in right and left sides. While reviewing literature of tumors of nasal cavity and paranasal sinuses, it was found that various authors have studied these tumors in different aspects, such as epithelial tumors, non epithelial tumors [7, 8]. Some have studied specific tumor entities like fibro osseus tumors and minor salivary gland tumors [9, 10]. Some others have included tumors of nasopharynx while studying tumors of nasal cavity and paranasal sinuses [11]. All this lead to some difficulty in finding out the exact incidence of various tumors in these studies and comparing with the present study.

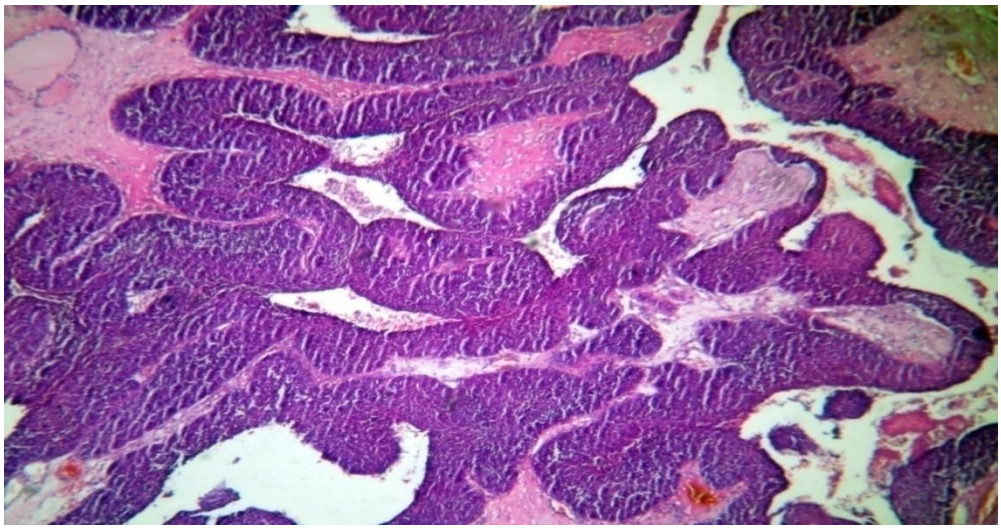
On analyzing the 93 benign tumors it was noted that the commonest in incidence was sinonasal papillomas (schneiderian papillomas) [12, 13]. Many authors have reported the relative incidence of sinonasal papillomas (Table-6).

**Table 6: Comparison of incidence of sinonasal papillomas**

| Authors | Incidence |
|---|---|
| Ghosh and Bhattacharya (1966) | 13.46% |
| Tondon et al (1971) | 23.53% |
| Butchanan& Slavin (1972) | 20.00% |
| Sagar et al (1976) | 1.00% |
| Bjerregaard et al (1992) | 16.67% |
| Panchal et al (2005)[7] | 34.80% |
| **Present study (2011)** | **47.32%** |

40 cases of inverted papillomas constituted the most common morphologic type and the predominant age group was seen in 7$^{th}$ followed by 5$^{th}$ decade. There were 25 males and 15 females.37 inverted papillomas involved the nasal cavity and 3 involved the paranasal sinuses. Nasal cavity was observed as the commonest site of involvement as also noted by Panchal etal [7] and others.Microscopy showed an endophytic growth of thickened squamous epithelium composed of squamous, transitional, and columnar cells with admixed mucocytes and inflammatory cell infiltrate (Fig.1). Nine cases of inverted papillomas showed malignant transformation to squamous cell carcinoma similar to Lesperance et al and Panchal etal [7].

**Figure1: Inverted papilloma - An endophytic growth of thickened squamous epithelium (H&E100x)**



One oncocytic papilloma [14] and three exophytic squamous papillomas presented in the nasal cavity constitute the remaining schneiderian papillomas. Second in order of frequency included 27 cases of hemangiomas. The peak age incidence was equally found in 2nd and 4th decade in comparison with studies of Sayed et al who found a peak age incidence in 3rd and 4th decade.

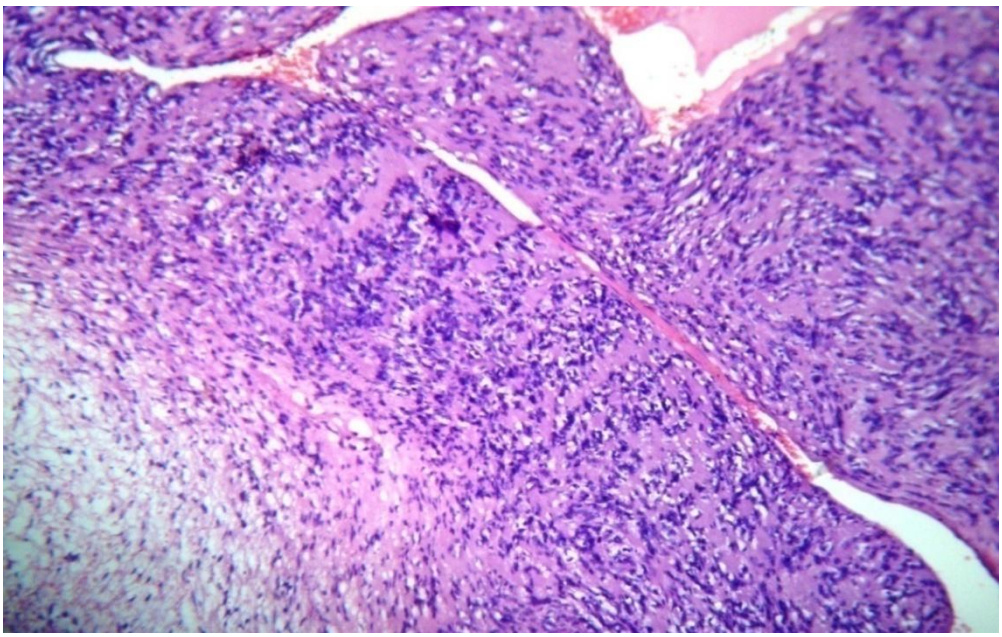
The most common location of hemangioma was nasal cavity. Capillary hemangioma was the predominant variant as also noted by Fu&perzin et al [8]. Microscopy showed lobular proliferation of variably sized vascular spaces composed of central capillaries and smaller ramifying tributaries. Males predominated over females. There were 3 cases of cavernous hemangioma [15].

Seven cases of hemangiopericytoma were encountered with an incidence of 7.53% and the mean age of presentation was 45 years. There were five females and two males. Among the seven, five cases presented in the nasal cavity and two in the maxilla. Microscopy showed an unencapsulated cellular neoplasm in diffuse growth pattern, in short fascicles of closely packed spindle cells with blunt nuclei, coarse chromatin, eosinophilic cytoplasm and vascular channels ranging from capillary size to stag horn vasculature. Immunostaining revealed tumor cells which showed diffuse positivity for Vimentin and negative for CD 34 markers [16].

Rare entities like schwannoma, ameloblastoma, osteoid osteoma and craniopharyngioma were reported. Intranasal schwannomas are very rare and less than 100 cases have been described in the literature by Buob D et al [17].The present study included six cases of schwannoma with an incidence of 6.45%.It was higher than the incidence of 4% reported by Hasewaga SL et al [18].

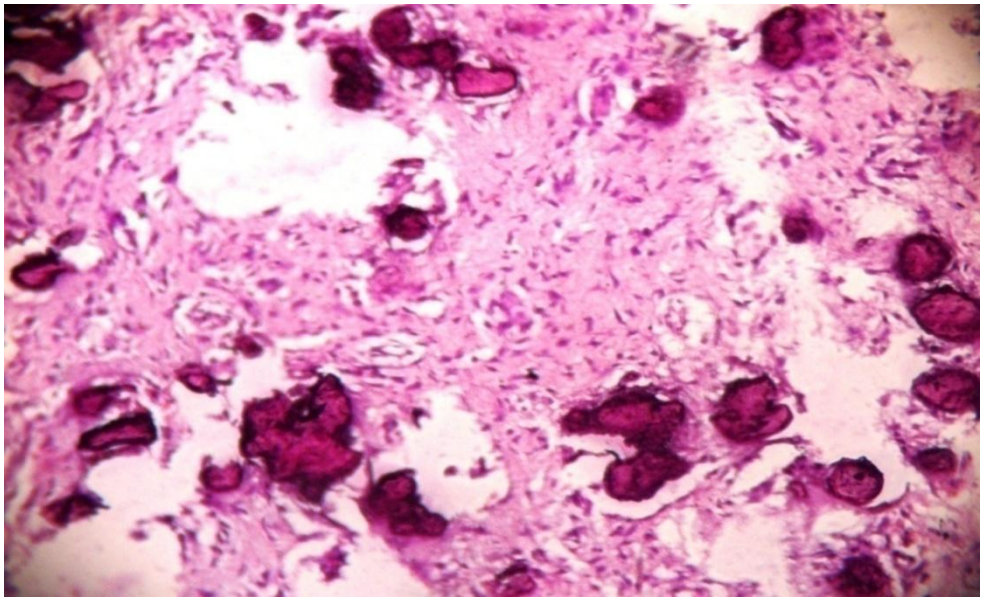
All the six cases presented in the age range of 30-67 years with a mean age of 41.7 years and an equal sex ratio. None of the tumors were encapsulated as described by Hasewaga SL et al [18] which is a distinctive feature of schwannoma in the sinonasal region. Microscopically tumors were composed of cellular areas (Antoni type A) with spindle cells arranged in palisades (Verocay bodies), together with more loosely structured areas (Antoni type B) with myxoid stroma (Fig.2) [18]. Five cases presented in the nasal cavity and one in the maxilla.

**Figure 2: Schwannoma -Cellular Antoni A areas arranged in palisades admixed with loose myxoid areas Antoni B areas (H&E100x)**



Five cases of ossifying fibroma were reported with an incidence of 5.38%. All the five cases presented in the age group of 13 to 32 years. The predominant site was the nasal cavity. Four tumors were psammomatous ossifying fibroma and microscopy showed fibro-osseous proliferation composed of calcified spherules admixed with fibrous stroma [19] (Fig.3).

**Figure 3: Psammomatoid ossifying fibroma- calcified spherules with fibrous stroma (H&E100x)**

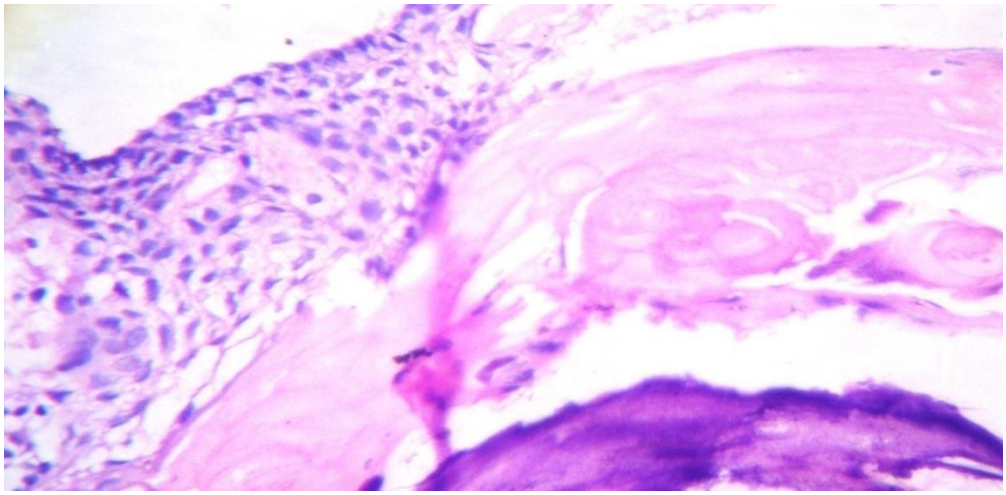


Primary ameloblastoma of the sinonasal tract (extragnathic ameloblastoms) is unusual and extraordinarily uncommon as described by Schafer et al [20]. Two rare cases of ameloblastoma were reported with an incidence of 2.15%.The mean age of presentation was 39 years. Both cases were male with one presenting in the nasal cavity and the other in the maxillary sinus. Microscopy showed follicular pattern composed of epithelial islands bounded at the periphery by a layer of columnar cells exhibiting hyperchromatic, palisaded and reverse polarized nuclei with inner stellate reticulum.

Osteoma was reported in one case with an incidence of 1.08% in an 18 year old male. This was similar to studies by Eggston et al and others. The tumor involved the frontal sinus. Similarly paranasal sinus was the commonest site in studies by Sooknundan et al &others [21].

One case of craniopharyngioma was reported in an 18 year old male who presented as right nasal cavity mass attached to septum in contrast to Bryne MN et al [22] who found that the peak age incidence was 1$^{st}$ decade. The tumor was composed of centrally situated stellate cells with small nuclei and clear cytoplasm surrounded by a palisade of basaloid appearing columnar cells with polarized nuclei (Fig.4).

**Figure 4:Basaloid appearing columnar cells with peripheral palisading, wet keratin and calcification (H&E400x)**



## CONCLUSION

To conclude, categorizing the sinonasal tumors according to histopathological features into various types helps us to understand the clinical presentation, treatment, clinical outcome and prognosis. The key in the diagnosis and treatment of sinonasal tumors remains a high index of suspicion and early diagnosis, as late presentation and delay in early diagnosis are major constraints to favorable outcome of treatment.

## CONFLICT OF INTEREST

The author has no conflict of interest to disclose.

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