The Study Of Clinico-Radiological Spectrum Of Benign Sinonasal Tumours – A Report Of 40 Cases

Benign sinonasal tumours (BST) are slow growing tumours usually detectable with its major complaints like nasal obstruction, epistaxis which are resistant to medical therapy. Clinical examination including anterior rhinoscopy and diagnostic nasal endoscopy direct to provisional diagnosis. Imaging plays a vital role in determining its extension and access for surgical management. Endonasal endoscopic sinus surgery has become the therapeutic armamentarium for these tumours, except for extensive ones which might require an external or combined approach. Aim of the study is to highlight the variable demographic presentation of such tumours and its clinico-radiological profile with management and outcome. **Method:** Prospective and Retrospective Observational study done in a tertiary care center over a study period of 5 years by consequetive sampling technique, which included cases of benign sinonasal tumours like Juvenile Nasopharyngeal Angiofibroma, Hemangioma, Inverted papilloma, Everted papilloma, Fibrous dysplasia, and Juvenile Ossifying Fibroma which we encountered; with the exclusion of people lost to follow up or not fit for surgery. **Result:** Juvenile Nasopharyngeal Angiofibroma was the commonest and seen only in males. CT PNS is the preferable imaging modality, though in certain cases MRI did play a role in diagnosis and preoperative evaluation. For smaller and moderate sized lesions, endonasal endoscopic surgery alone sufficed whereas larger ones required a combined approach (i.e along with sublabial or transfacial incision.) **Conclusion:** Clinical presentation along with Imaging, aids in diagnosis of BST’s. Endonasal endoscopic approach is the modern treatment modality; combined approach gives better results for large and extended lesions.

**Keywords:** Benign sinonasal tumours, Fibrous dysplasia, Hemangioma, Papilloma, Juvenile Nasopharyngeal Angiofibroma, Juvenile Ossifying Fibroma.

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**ARTICLE INFO**

**ABSTRACT**

Benign sinonasal tumours (BST) are slow growing tumours usually detectable with its major complaints like nasal obstruction, epistaxis which are resistant to medical therapy. Clinical examination including anterior rhinoscopy and diagnostic nasal endoscopy direct to provisional diagnosis. Imaging plays a vital role in determining its extension and access for surgical management. Endonasal endoscopic sinus surgery has become the therapeutic armamentarium for these tumours, except for extensive ones which might require an external or combined approach. Aim of the study is to highlight the variable demographic presentation of such tumours and its clinico-radiological profile with management and outcome. **Method:** Prospective and Retrospective Observational study done in a tertiary care center over a study period of 5 years by consequetive sampling technique, which included cases of benign sinonasal tumours like Juvenile Nasopharyngeal Angiofibroma, Hemangioma, Inverted papilloma, Everted papilloma, Fibrous dysplasia, and Juvenile Ossifying Fibroma which we encountered; with the exclusion of people lost to follow up or not fit for surgery. **Result:** Juvenile Nasopharyngeal Angiofibroma was the commonest and seen only in males. CT PNS is the preferable imaging modality, though in certain cases MRI did play a role in diagnosis and preoperative evaluation. For smaller and moderate sized lesions, endonasal endoscopic surgery alone sufficed whereas larger ones required a combined approach (i.e along with sublabial or transfacial incision.) **Conclusion:** Clinical presentation along with Imaging, aids in diagnosis of BST’s. Endonasal endoscopic approach is the modern treatment modality; combined approach gives better results for large and extended lesions.

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INTRODUCTION:
Benign sinonasal tumours (BST) present itself as a challenge for the ENT surgeon due to the variety of histological entities, rarity of tumours and also because of its clinical presentation which is common for so many conditions of the nose and paranasal sinuses.¹
A minimally invasive endoscopic approach for the management of benign sinonasal tumours offers several advantages including excellent illumination, direct visualization, enhanced magnification, maximal preservation of uninvolved vital structures and sparing of facial incisions and subsequent scars as well as intra-operative and postoperative morbidity.² Lesions extending beyond the nose and paranasal sinuses such as the anterior skull base and orbit can be accessed with a high degree of precision with outcomes comparable with the conventional external approach.
In the present scenario nasal endoscopy is emerging as an essential tool in the diagnosis and successful treatment of wide variety of benign sinonasal tumours ³,⁴,⁵. The BST’s can briefly be divided into benign epithelial tumours which include inverted papillomas, oncocytomas; benign soft tissue tumours that include angiofibroma, haemangioma, leiomyoma; benign tumours of bone and cartilage like osteoma, and miscellaneous varieties including meningioma, teratoma, langerhans cell histiocytosis, craniopharyngioma etc.
Aim of the study is to highlight the variable demographic clinico-radiological profile with management and outcome. Also the role of endoscopic sinus surgery will be evaluated by completeness of resection or accessibility, incidence of complications and postoperative morbidity.

METHODS
We have done both prospective and retrospective observational study in patients diagnosed with BSTs. Study has been done at tertiary care center for a period of 5 years from October 2013 to September 2018 in whom surgery for BST excision had been done. Hence, the consecutive sampling of 40 cases who satisfied the inclusion and exclusion criteria will be shortlisted and the details of their demographic distribution, clinic-radiological presentation, its management and complications recorded. Ethics committee approval taken.
The data collected will be tabulated in a systematic format, stored and analysed. Microsoft office 2007 was used to make tables. The findings of the study will be analysed by appropriate statistical test. For quantitative data, mean will be calculated. For categorical data, number and percentage will be calculated.

Inclusion Criteria: All cases of Benign Sinonasal Tumours
Exclusion Criteria: Patients lost to follow up or not fit for surgery.

OBJECTIVES
To study the clinical presentation of BSTs and the investigation of choice (radiological i.e. Computed Tomography or Magnetic Resonance Imaging) in determining the diagnosis and resectability. To evaluate the Surgical approach (the need for external approach along with endoscopy) with its complications, postoperative morbidity and final surgical outcome

RESULT:

<table>
<thead>
<tr>
<th>BSTs</th>
<th>Male: Female</th>
<th>10-30 yrs</th>
<th>31-40 yrs</th>
<th>41-50 Yrs</th>
<th>&gt;50 Yrs</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>JNA</td>
<td>18: 0</td>
<td>17</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>45</td>
</tr>
<tr>
<td>Hemangioma</td>
<td>4: 7</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>11</td>
<td>27.5</td>
</tr>
<tr>
<td>Inverted Papilloma</td>
<td>3: 4</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>07</td>
<td>17.5</td>
</tr>
</tbody>
</table>

Tumour Distribution with Age and Sex (Table 1)
<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrous Dysplasia (FD)</td>
<td>0:2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Juvenile Ossifying Fibroma (JOF)</td>
<td>1:0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Everted Papilloma (EP)</td>
<td>0:1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total with percentage</td>
<td>26:14</td>
<td>28(70%)</td>
<td>4(10%)</td>
<td>7(17.5%)</td>
<td>1(2.5%)</td>
</tr>
</tbody>
</table>

In our study the most common BSTs encountered was angiofibroma (JNA) (45%) followed by hemangioma (27.5%) and the least in number were of JOF and EP. Age of the patients were ranged from 11 to 57 years of age. The most of the study population (JNA, FD, JOF and hemangiomas) affected were between 10 to 30 years, whereas cases of IP were found in age group of 40 to 50 years.

In our study a slight male preponderance was seen in overall BSTs (male : female ratio being 1.8:1). All the cases of JNA and the case of JOF were found in males, the two cases of FD only in females; while the others i.e. papillomas, hemangioma had female predominance. (Table 1)

**Symptomology (Table 2)**

The commonest presenting complaint was found to be nasal blockage found in 90% of cases and followed by nasal bleeding. None of the patients had proptosis, loss of vision or double vision, neck swelling. (Table 2)

Epistaxis is fearsome to the patient and if uncontrollable, might require blood transfusion or can even be life-threatening.

Epistaxis can direct towards the diagnosis of nasal lesions (by eliminating systemic and general causes). In our study, about 50% of cases with epistaxis was diagnosed to have JNA, 32% with hemangioma, 9% with IP.

**Nasal mass on anterior rhinoscopy (Table-3)**

Mass visible on anterior rhinoscopy or on diagnostic nasal endoscopy (DNE) helps in diagnosing and
evaluating mass in nasal cavity. We usually avoid DNE in a case with history of epistaxis to avoid unpredictable trauma. Extensive tumours can lead to facial deformity as seen in Fig: 1

Out of 40 patients in study population, anterior rhinoscopy revealed (Table 3) that 18 patients (45%) had mass only in the right nasal cavity, 13 (32.5%) had mass only in the left side, 4 (25%) cases had seen bilaterally and, 5(25%) cases had no mass seen as below.

<table>
<thead>
<tr>
<th>Right side</th>
<th>Left side</th>
<th>Bilateral</th>
<th>No visible mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>13</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Table 3: Anterior rhinoscopy examination for visualisation and localisation of mass**

**Radiological Investigations (Table 4)**
Except the 11 cases of hemangioma, rest 29 (72.5%) required imaging. Out of my 40 patients, Computed Tomography of Paranasal Sinus (Plain + Contrast) (Table 4) was done in all 29 patients to evaluate the extent of lesion as well as bony erosion (Fig: 2).

**Fig: 1-** Facial asymmetry, with right cheek protrusion and flattening of dorsum nose due to FD

**Fig: 2-** soft tissue lesion with calcified spicules involving left maxillary sinus wall causing long standing pressure related bone thinning and erosion (infero-lateral wall of maxilla, palate, infraorbital rim), medialisation of medial sinus wall.
MRI (Table 4) was done in 4 patients (one each of IP, EP, JNA, FD) due to extensive nature of the lesion (intracranial/intraorbital extension). MRI helps in delineating and demarking soft tissue extension.

<table>
<thead>
<tr>
<th>Radiological investigation (Table 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benign Nasal Tumour</strong></td>
</tr>
<tr>
<td>JNA</td>
</tr>
<tr>
<td>IP</td>
</tr>
<tr>
<td>FD</td>
</tr>
<tr>
<td>JOF</td>
</tr>
<tr>
<td>EP</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

**Extent of Involvement:** This is judged by nasal endoscopy and imaging as well. These benign lesions has originated from one subsite and extended to other site, due to their feature of non detectability in early phase, as they are asymptomatic and slow growing. Hence a lesion has involvement of multiple sites at a time. 1 case of JNA extended from nasopharynx to oropharynx and another case had intracranial extension. Two cases of FD had intraorbital extension as well.

<table>
<thead>
<tr>
<th>Table 5- Site of involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site of involvement</strong></td>
</tr>
<tr>
<td>No of cases</td>
</tr>
</tbody>
</table>

Most of the lesions were seen in the nasal cavity, nasopharynx (some of them has originated from or extended to) while among the sinuses the commonly involved was the maxillary sinus (Table 5).

**Endoscopic / Combined Approach:**
By clinical profile and imaging, after probable diagnosis, evaluation of extent of lesion; the plan of surgical action for BSTs has been decided. All the cases were operated under adequate hypotensive field. Out of 40 patients, 7(17.5%) required a combined approach i.e. 4 cases of JNA and 2 cases of fibrous dysplasia required a sublabial incision; One case of inverted papilloma required a Lynch Howarth incision (external fronto-ethmoidectomy). While rest (33) i.e. 82.5% cases were underwent only endonasal endoscopic excision (Table 6).
Among 40 cases of benign sinonasal tumours 7 cases were recurrent i.e. 3 recurrent out 18 (16.6%) cases of JNA, 3 recurrent out of 7 (42.8%) cases of IP and 1 recurrent out of 11 (9.0%) case of hemangioma. Final diagnosis was given after its histopathological (HP) report in Fig-3.

**Resectability:**
95% of (38) cases were completely resectable with or without combined approach. 82.5% (33 out of 38 cases) of completely resected tumours underwent only endonasal endoscopic approach while 12.5% (5) cases were required a combined approach for its complete resection. Out of 40 cases in our study population two (5%) (1 case JNA + 1 case FD) cases were not completely resectable due to its extensive extension. Chances of complete resectability is less only in cases of intraorbital and intracranial extension, where multidisciplinary approach requiring anaesthesiologist, neurosurgeons, would be able to provide better outcomes.

**Perioperative Complications:**
The best way to avoid intraoperative hemorrhage is proper preoperative preparation (control of hypertension, good sedation, topical and local anaesthesia) and to use a careful surgical technique. Seven [5 out of 18 cases of JNA + 1 case of IP + 1 case of JOF] cases had significant blood loss that required blood transfusion. In this study none of the patients developed CSF leak or any orbital complications. The mean duration of hospital stay in our study sample who had undergone endoscopic surgery was found to be 8.2 days, with a minimum 3 days duration seen in hemangioma and maximum duration of 25 days seen in JNA who had developed post operative DIC.

**DISCUSSION**
In our study, age distribution ranged from 10 to 57 years. In 70% of cases, the common age group was between 10 to 30 years of age. Narayana et al also shows similar (46%) incidence found in 11 to 30 years
of age while D. S Rawat et al and D Garg et al showed maximum distribution in the age group of 11 to 20 years and 21 to 30 years respectively.\textsuperscript{5,7,8} In study by Narayana et al 10% were below the age of 10 and none above 60 years.\textsuperscript{6}

In our study, Inverted papilloma was found to be more common in the higher age groups i.e. 5\textsuperscript{th}-6\textsuperscript{th} decades. For the IP, study by Giant et al had showed the mean age of initial diagnosis to be 51.8 years and Ashok Kumar et al showed the peak age of occurrence to be in the 5\textsuperscript{th}-7\textsuperscript{th} decade.\textsuperscript{9,10}

A slight overall male preponderance in BSTs with male: female ratio of 1.8:1 seen in our study while in studies by D.S. Rawant et al, Lathi et al shown 4.4:1, 1.71:1 respectively.\textsuperscript{7,11} Angiofibroma was found only in male which is similar with Naryana et al.\textsuperscript{6} Both the cases of fibrous dysplasia was seen in teenage girls but however study by Nityashri et al showed equal gender preponderance.\textsuperscript{12} Hemangioma and papillomas had a slight female preponderance seen but with Ashok Kumar et al these had male preponderance.\textsuperscript{10}

In our study the various benign tumours found were angiofibroma (45%), hemangioma (27.5%), IP (17.5%), EP and JOF each of 2.5%. Study by Narayan et al also showed angiofibroma (26%) as the most common BSTs type followed by IP (13.3%), and hemangioma (10%) while FD was found in 3.3%, JOF in 6.6%.\textsuperscript{6}

Studies by Zafar et al, Bist et al also showed angiofibroma as the most common benign tumour.\textsuperscript{13,14} Whereas there are studies like those done by Majumder et al, Dasgupta et al, Kulkarni et al that had shown haemangioma as the most common variety.\textsuperscript{15,16,17}

The most common presenting symptom was found to be nasal obstruction (90%) followed by nasal bleeding (85%) with similar results shown in study by Narayana et al.\textsuperscript{6} In our study all patient with hemangioma had presented with epistaxis, however 1 case of JNA surprisingly did not have epistaxis. 75% of patients had mass seen on anterior rhinoscopy. Mostly patients had unilateral mass on right side (45%) > left side (32.5%). In the study by Narayana et al mass on anterior rhinoscopy was seen in 40% of the benign tumours.\textsuperscript{6} No evidence has seen for side preferability.

CT PNS was done in 72.5% of patients of benign nasal mass. Hemangioma cases didn’t require any radiological investigations as anterior rhinoscopy and diagnostic endoscopy revealed the entire extent of the disease. Although in various studies like those done by D G Lee et al has suggested that in hemangiomma, CT is useful not only in identifying the site of origin and assessing the extent but also in suggesting the nature of the lesion.\textsuperscript{18} In our study, CT scan findings showed involvement of nasal cavity and nasopharynx as mostly seen in all the cases of JNA, while the commonly involved sinus was the maxillary sinus. Study done by Nadia et al also showed maxillary sinus as the most commonly involved sinus.\textsuperscript{19} Orbital involvement was seen in both the cases of FD. While in the study by Duan C et al most of the FD was located in the sphenoid sinus (50%), nasal cavity (39%) or ethmoid sinus (36%).\textsuperscript{20} Intracranial involvement was seen in 5.5% cases of JNA in our study similar to Mariane et al study.\textsuperscript{21}

In our study 82.5% of BSTs were treated with endonasal endoscopic approach alone while 17.5% of cases underwent a combined approach. In our study 77.7% (14 out of 18) of JNA required only an endonasal endoscopic approach which in the study by Mariane et al was 85% cases.\textsuperscript{21} In study by Winter et al 64.4% cases and in our study 85.7% (6 out of 7) cases of IP required endoscopic approach alone and for the rest of the patients an additional transoral or transfacial approach was necessary due to difficult tumour localization.\textsuperscript{22}

In our study one cases of FD was not resected completely required combined approach, as a small part of it involved the palatal bone and the orbital floor. The study by Duan C et al, surgical strategy included an exclusive endoscopic approach where 25 cases of FD were done by the endoscopic approach and the effect was good while 3 cases underwent combined approach.\textsuperscript{20}

In our study One case of JNA was not completely resectable due to its intracranial extension In the study of 20 cases of JNA by Maraine et al, all cases were resected completely with no recurrence (17 with endonasal endoscopy alone and 3 with combined approach). In the study by Trichy Narayanan et al 2 out of 15 patients who underwent endoscopic JNA...
excision had residual disease. There were 7 recurrent cases and required revision surgery i.e. 3(16.6%) cases out of 18 JNA, 3(42.8%) out of 7 cases of IP and 1(9%) case out of 11 hemangioma.

According to the studies by Sun et al and Pamuk et al the total recurrence rate of JNA was 39.2% and 20.8% respectively. In the study by Lin Chung et al the recurrence rate of inverted papilloma was 17% whereas in the study by Smith et al showed recurrence of hemangioma to be 42%.

The most common complication encountered was significant hemorrhage that required blood transfusion perioperatively, in our study it was seen in 27.8% of cases of JNA excision. In the study by Borghei et al and Hansa et al on JNA excision the amount of blood required was about 0.75 and 2 to 8 packs of blood on an average respectively. In the present study it amounts to 0.5 packs of blood on an average. In the Study by Trichy Nararyanan et al, none of the patients required blood transfusion.

CONCLUSION:
Clinical profile including anterior rhinoscopy and nasal endoscopy helps in evaluating benign sinonasal tumours and coming to a provisional diagnosis. Computed Tomography with SOS MRI helps in evaluating depth of lesion like information regarding the presence, extent and access to the disease is useful in identifying the site, extent and the nature of the lesion. Endoscopic approach is a successful mode of treatment for benign sinonasal tumours, with minimal post operative morbidity. It provides good accessibility for its complete resection and in cases of limited assess, a combined approach should be considered via a sublabial or transfacial incision along with endonasal endoscopy.

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