

A Study on Frontoethmoidal Osteomas, Their Risk Factors and Management in tertiary Centre of West Bengal: A Cross-sectional Study

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Received: 16-07-2020

Accepted: 01-08-2020

Published: 28-08-2020

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ABSTRACT

Background: Frontoethmoidal osteomas are benign, slow-growing bone tumours typically found in the paranasal sinuses, especially the frontal and ethmoid regions. Though usually asymptomatic, larger osteomas can lead to sinus obstruction, headaches, or orbital complications. Objective: To evaluate the demographic profile, risk factors, clinical presentations, and surgical management outcomes of patients with frontoethmoidal osteomas in West Bengal. Methods: This cross-sectional observational study involved 24 patients diagnosed with frontoethmoidal osteomas. Clinical, radiological, and surgical data were collected. All patients underwent CT imaging, and depending on size/location, were managed through endoscopic or external surgical approaches. Results: Most patients were male (66.7%), with the highest incidence in the 31–50 age group. Common symptoms were frontal headaches (75%) and nasal obstruction (58.3%). Key risk factors included chronic sinusitis (41.7%) and facial trauma (25%). Surgical management included endoscopic excision in 70.8% of cases and external front ethmoidectomy in 29.2%. No recurrences were observed during 6 months of follow-up. Conclusion: Frontoethmoidal osteomas, though benign, may cause significant morbidity if untreated. CT scans are critical for diagnosis and planning. Endoscopic excision is preferred for accessible lesions, while external approaches remain necessary for larger or laterally placed tumours.

KEYWORDS: Frontoethmoidal, facial trauma.

INTRODUCTION

Frontoethmoidal osteomas are the most common type of benign bone tumors affecting the paranasal sinuses. They are often discovered incidentally on imaging but can cause symptoms when large enough to obstruct sinus drainage or compress adjacent structures such as the orbit or cranial cavity[1].

Frontoethmoidal osteomas, benign bone tumors, have a prevalence of roughly 0.4% to 3% in the general population. These tumors are most commonly found in the craniofacial region, specifically within the paranasal sinuses, with a higher proportion in the frontal sinus. While often asymptomatic and discovered incidentally, they can cause various symptoms and complications if they grow large enough to obstruct surrounding structures or invade adjacent areas. Prevalence and Location: Overall Prevalence: Osteomas in the paranasal sinuses, as detected by CT scans, range from 0.42% to 3%, according to a study published in Heliyon[2].

Most Common Location: The frontal sinus is the most frequent site, followed by the ethmoid and maxillary sinuses. Frequency of Occurrence: Osteomas are considered the most common benign tumours of the paranasal

sinuses, with a prevalence ranging from 0.014 to 0.43%. Clinical Presentation: Asymptomatic: Osteomas are often asymptomatic and discovered incidentally during imaging for other reasons. Symptomatic: When symptoms occur, they can include headache, facial pain, nasal congestion, proptosis (bulging of the eye), and visual disturbances[3]. Large or Giant Osteomas: Large osteomas (greater than 3 cm) or "giant" osteomas can cause serious complications if they impinge on surrounding structures like the orbit or brain. Management: Observation: Small, asymptomatic osteomas are often monitored with periodic CT scans to assess for growth[4]. Surgical Removal: Surgical intervention is typically considered for symptomatic osteomas or those with significant growth or potential for complications. Surgical Approaches: Surgical approaches can include endoscopic endonasal techniques or open procedures, depending on the size, location, and extent of the osteoma. The exact etiology is unclear but has been linked to chronic infections, trauma, and developmental anomalies. Despite their benign nature, large osteomas require surgical removal to prevent complications like mucocele formation or orbital involvement[5].

This study investigates the prevalence, possible causative factors, clinical features, and surgical outcomes of frontoethmoidal osteomas in a tertiary hospital setting in West Bengal.

METHODS

This study was conducted in a tertiary hospital. After obtaining institutional ethical committee approval. It was Cross-sectional observational study conducted on 24 patients in the department of Otolaryngology, at a tertiary care centre from January / 2020 to July/2020 .

Total 24 participant were approached to project among them No one were excluded in this study and Total 24 Confirmed cases were included on the basis of fulfilling of the eligibility criteria. The institute Ethics Committee approval was obtained before starting the sample collection. A written and informed consent was taken from the patient regarding the study in his/her vernacular language and English. In this study Patients were subjected to: A detailed history of sign & symptoms and its duration. Detailed history of systemic diseases and its duration, medication were noted. Patients were subjected to General physical examination

Study Design:

Cross-sectional descriptive study.

Study Setting:

ENT of tertiary care hospitals in West Bengal over 6 month

Sample Size:

24 patients diagnosed with frontoethmoidal osteomas.

Inclusion Criteria:

- Age 18–60 years
- Radiologically confirmed frontoethmoidal osteomas
- Informed consent obtained

Exclusion Criteria:

- Patients with recurrent osteomas
- Malignant bone tumors
- Comorbid cranial tumors

Data Collection Tools:

- Structured proforma for demographic and clinical data
- CT PNS for radiological diagnosis
- Histopathology post-surgery
- 6-month follow-up for recurrence or complications

Statistical Analysis:

Data were analysed using descriptive statistics and frequencies.

RESULTS

In this study we found that Frontoethmoidal Osteomas is associated with demographic profile of patient. 31–40 age group patient suffered of Frontoethmoidal Osteomas its prevalence is 37.5% followed by 41–50 age group its prevalence is 29.2%. Frontoethmoidal Osteomas is predominance among urban residence its prevalence is 58.3%.

Male are more prone to suffered of Frontoethmoidal Osteomas. its prevalence is 66.7%

63.1% Frontoethmoidal Osteomas were mor common among Manual laborers its prevalence is 41.7% (Table 1).

Demographic Profile of Patients Table 1 (n=24)

Variable	Category	Frequency	Percentage (%)
Age Group (years)	18–30	4	16.7%
	31–40	9	37.5%
	41–50	7	29.2%
	51–60	4	16.7%
Gender	Male	16	66.7%
	Female	8	33.3%
Residence	Urban	14	58.3%
	Rural	10	41.7%
Occupation	Manual laborers	10	41.7%
	Office workers	6	25.0%
	Homemakers	5	20.8%
	Students/Other	3	12.5%

Risk Factors Associated for Frontoethmoidal Osteomas are Chronic rhinosinusitis, History of facial trauma, Congenital/developmental anomaly, Previous nasal or sinus surgery
And no identifiable risk factor (Table 2)

Risk Factors Associated with Frontoethmoidal Osteomas Table 2

Risk Factor	No. of Patients	Percentage (%)
Chronic rhinosinusitis	10	41.7%
History of facial trauma	6	25.0%
Congenital/developmental anomaly	4	16.7%
Previous nasal or sinus surgery	2	8.3%
No identifiable risk factor	2	8.3%

Symptoms Reported

- Frontal headache: 18 patients (75%)
- Nasal obstruction: 14 patients (58.3%)
- Facial pressure/pain: 8 patients (33.3%)
- Diplopia/visual symptoms: 2 patients (8.3%)

Surgical Management

Procedure	No. of Patients	Percentage (%)
Endoscopic sinus surgery	17	70.8%
External frontoethmoidectomy	7	29.2%

All patients were histopathologically confirmed to have compact or mixed-type osteomas. No recurrence was noted during the 6-month follow-up. Minor complications such as transient oedema or nasal crusting were observed in 4 cases.

DISCUSSION

Our study reinforces the predominance of frontoethmoidal osteomas in middle-aged males. Chronic sinus inflammation remains the leading risk factor, supporting the inflammatory theory of osteoma development[6]. Frontoethmoidal osteomas, which are benign bone tumours in the frontoethmoidal region, are more prevalent in men and typically diagnosed between the third and sixth decades of life. While they can occur at any age, studies suggest a slight male predominance and a higher incidence in individuals over 40. The exact causes are not fully understood, but theories include embryologic origins, trauma, and inflammation. Elaboration:

Age: Frontoethmoidal osteomas are most frequently diagnosed in the second to fifth decades of life, though they can be found in both paediatric and adult populations.

Gender: While some studies indicate no significant gender difference, others suggest a slight male predominance[7-10]. The male-to-female ratio can range from 2:1 to 3:1 according to one study, Etiology: The exact causes of frontoethmoidal osteomas are not fully understood, but several theories exist:

Embryologic Theory: Osteomas may arise from remnants of embryonic cartilage or periosteum. Traumatic Theory: Injuries to the frontoethmoidal region may stimulate bone-forming cells, leading to osteoma formation[11].

In this study we found that Frontoethmoidal Osteomas is associated with demographic profile of patient. 31–40 age group patient suffered of Frontoethmoidal Osteomas its prevalence is 37.5% followed by 41–50 age group its prevalence is 29.2%. Frontoethmoidal Osteomas is predominance among urban residence its prevalence is 58.3%. Male are more prone to suffered of Frontoethmoidal Osteomas. its prevalence is 66.7%. 63.1% Frontoethmoidal Osteomas were mor common among Manual laborers its prevalence is 41.7% (Table 1).

Frontoethmoidal osteomas are benign, slow-growing bone tumors, and while the exact causes are often unknown, some potential risk factors include: inflammation, trauma, and hereditary disorders. Additionally, some studies suggest a higher prevalence in males, potentially due to increased exposure to head injuries[12].

Elaboration: Inflammation: Chronic inflammation, such as sinusitis, may play a role in the development of osteomas. Trauma: A history of head trauma is reported in some cases, suggesting that injury to the bone may contribute to osteoma formation. Hereditary Disorders: Certain hereditary conditions, like Gardner's syndrome, are associated with a higher risk of osteomas[13]. Gender: Some studies show a slightly higher incidence in males, possibly linked to more frequent head injuries. Other relevant factors: Age: While osteomas can occur at any age, they are more commonly found in individuals between the second and fifth decades of life. Inflammatory Theory: Sinusitis or other inflammatory processes may contribute to osteoma development by stimulating bone growth[14].

Racial Prevalence: Racial prevalence is not well-documented in the literature. Location: The ethmoid sinuses are the most common site for osteomas, followed by the frontal and sphenoid sinuses Radiologically, CT scans remain the gold standard for detection and preoperative planning. Most osteomas were amenable to endoscopic excision, highlighting the evolution of minimally invasive techniques [15,16]. However, larger or laterally located lesions required external approaches. Surgical outcomes were excellent, with no recurrence and minimal complications, aligning with existing literature on benign behaviour and surgical curability of osteomas.

CONCLUSION

Frontoethmoidal osteomas, while rare and often asymptomatic, can cause significant complications if neglected. Identifying risk factors such as chronic sinusitis and trauma is essential for prevention and early diagnosis. Surgical management—especially endoscopic techniques—offers a safe, effective, and recurrence-free treatment in the majority of cases.

SOURCE OF FUNDING: No

CONFLICT OF INTEREST

The authors report no conflicts of interest

SUBMISSION DECLARATION

This submission has not been published anywhere previously and that it is not simultaneously being considered for any other journal.

REFERENCES

1. Giant osteomas of the ethmoid and frontal sinuses: clinical characteristics and review of the literature. Cheng KJ, Wang SQ, Lin L. *Oncol Lett.* 2013;5:1724–1730. doi: 10.3892/ol.2013.1239. [DOI] [PMC free article] [PubMed] [Google Scholar]
2. Characteristics of paranasal sinus osteoma and treatment outcomes. Lee DH, Jung SH, Yoon TM, Lee JK, Joo YE, Lim SC. <https://doi.org/10.3109/00016489.2014.1003093>. *Acta Otolaryngol.* 2015;135:602–607. doi: 10.3109/00016489.2014.1003093. [DOI] [PubMed] [Google Scholar]
3. Giant ethmoid osteoma with orbital extension presenting with epiphora. Osma U, Yaldiz M, Tekin M, Topcu I. <https://www.rhinologyjournal.com/Abstract.php?id=383>. *Rhinology.* 2003;41:122–124. [PubMed] [Google Scholar]
4. Management of the large cranial osteoma: experience with 13 adult patients. Izci Y. *Acta Neurochir (Wien)* 2005;147:1151–1155. doi: 10.1007/s00701-005-0605-4. [DOI] [PubMed] [Google Scholar]
5. A rare association of tension pneumocephalus and a large frontoethmoidal osteoma: imaging features and surgical treatment. Guedes Bde V, da Rocha AJ, da Silva CJ, dos Santos AR, Lazarini PR. <https://doi.org/10.1097/SCS.0b013e3181f76031>. *J Craniofac Surg.* 2011;22:212–213. doi: 10.1097/SCS.0b013e3181f76031. [DOI] [PubMed] [Google Scholar]
6. Frontoethmoid sinus osteoma as a cause of subperiosteal orbital abscess. Sahin A, Yildirim N, Cingi E, Atasoy MA. *Adv Ther.* 2007;24:571–574. doi: 10.1007/BF02848779. [DOI] [PubMed] [Google Scholar]
7. Endoscopic removal technique of a huge ethmoido-orbital osteoma. Miman MC, Bayindir T, Akarcay M, Erdem T, Selimoglu E. <https://doi.org/10.1097/SCS.0b013e3181aee30e>. *J Craniofac Surg.* 2009;20:1403–1406. doi: 10.1097/SCS.0b013e3181aee30e. [DOI] [PubMed] [Google Scholar]
8. Ethmoid sinus osteoma presenting as epiphora and orbital cellulitis: case report and literature review. Mansour AM, Salti H, Uwaydat S, Dakroub R, Bashshour Z. *Surv Ophthalmol.* 1999;43:413–426. doi: 10.1016/s0039-6257(99)00004-1. [DOI] [PubMed] [Google Scholar]
9. Endonasal endoscopic resection of ethmoido-orbital osteoma compressing the optic nerve. Naraghi M, Kashfi A. *Am J Otolaryngol.* 2003;24:408–412. doi: 10.1016/s0196-0709(03)00085-1. [DOI] [PubMed] [Google Scholar]
10. Our experience with the surgical management of paranasal sinus osteomas. Cokkeser Y, Bayarogullari H, Kahraman SS. *Eur Arch Otorhinolaryngol.* 2013;270:123–128. doi: 10.1007/s00405-012-1981-z. [DOI] [PubMed] [Google Scholar]
11. The management of the paranasal sinus osteomas. Arslan HH, Tasli H, Cebeci S, Gerek M. *J Craniofac Surg.* 2017;28:741–745. doi: 10.1097/SCS.0000000000003397. [DOI] [PubMed] [Google Scholar]

12. Ethmoid sinus osteoma: diagnosis and management. Pons Y, Blancal JP, Vérillaud B, Sauvaget E, Ukkola-Pons E, Kania R, Herman P. <https://doi.org/10.1002/hed.22945>. Head Neck. 2013;35:201–204. doi: 10.1002/hed.22945. [DOI] [PubMed] [Google Scholar]
13. Frontal sinus osteoma presenting with meningitis and epilepsy. Kolcun JP, Richardson AM, Gernsback JE, Rosenberg A, Komotar RJ. World Neurosurg. 2019;123:216–220. doi: 10.1016/j.wneu.2018.12.031. [DOI] [PubMed] [Google Scholar]
14. Osteoma of the middle turbinate presenting with frontal lobe abscess and seizure. Virk RS, Sawhney S. J Clin Diagn Res. 2017;11:0–3. doi: 10.7860/JCDR/2017/25992.9900. [DOI] [PMC free article] [PubMed] [Google Scholar]
15. A rare cause of headache: pneumatized nasal septum osteoma. Erdoğan O, Ismi O, Tezer MS. J Craniofac Surg. 2017;28:0–7. doi: 10.1097/SCS.0000000000003895. [DOI] [PubMed] [Google Scholar]
16. A giant osteoma of the ethmoid sinus. Ishii T, Sakamoto Y, Miwa T, Yoshida K, Kishi K. <https://doi.org/10.1097/SCS.0000000000004206>. J Craniofac Surg. 2018;29:661–662. doi: 10.1097/SCS.0000000000004206