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NAVIGATING THE FRONTOETHMOIDAL COMPLEX: CASE REPORT OF OSTEOMA EXCISION VIA COMBINED APPROACH

Otorhinolaryngology

S. S. Suhas MBBS, MS ENT, Mysore Medical College And Research Institute Mysore, Karnataka-570001.

K. Ashitha MBBS, Mysore Medical College And Research Institute Mysore, Karnataka-570001.

Sodisetty Sai Koti Manikanta Avinash MBBS, Mysore Medical College And Research Institute Mysore, Karnataka-570001.

ABSTRACT

Background: Osteomas of the paranasal sinuses are benign, slow-growing bony tumours, commonly arising in the frontal and ethmoid sinuses. Extension into the orbit is rare but can present with ophthalmic symptoms such as proptosis. **Case Presentation:** We report the case of a 46-year-old male who presented with a two-year history of slowly progressive right-sided proptosis and lateral globe displacement, associated with vague periorbital discomfort. There was no visual impairment or ocular motility restriction. A history of prior orbital trauma was noted. Radiologic imaging revealed a well-circumscribed, hyperdense mass arising from the right ethmoid sinus, extending into the orbit and displacing the optic nerve. Surgical excision via lateral rhinotomy was performed. Intraoperatively, an ivory-type osteoma was completely excised. A low-pressure cerebrospinal fluid (CSF) leak occurred intraoperatively and was successfully managed. Postoperative recovery was uneventful, with resolution of symptoms and preserved visual function. Histopathology confirmed the diagnosis of ivory osteoma. **Conclusion:** Frontoethmoidal osteomas can cause orbital symptoms through local extension. Early recognition and surgical management are key to preserving ocular function and preventing complications.

KEYWORDS

Frontoethmoidal osteoma, orbital mass, unilateral proptosis, paranasal sinus tumours, CSF leak, lateral rhinotomy, ivory osteoma

INTRODUCTION

Osteomas are benign osteogenic neoplasms that frequently arise within the paranasal sinuses, with a predilection for the frontoethmoid region. While their overall incidence in the general population remains low, reported between approximately 0.014% and 0.43% of sinus imaging studies, they represent the most common benign tumours within this anatomical domain.[1] Typically, the frontal sinus is most affected (60–70%), followed by the ethmoidal cells (20–30%), with rarer involvement of maxillary and sphenoid sinuses.[2] Ethmoidal osteomas tend to manifest symptoms earlier than frontal ones due to the ethmoid's constrained anatomical space.[3]

These tumours generally demonstrate indolent, asymptomatic growth and are often identified incidentally on imaging performed for unrelated indications.[4] However, when they grow substantially, surpassing 30 mm in diameter or exceeding 110 g in weight, they are classified as "giant" osteomas.[5] Such lesions are uncommon but may encroach upon adjacent structures, precipitating clinical symptoms. Notably, orbital extension can produce ophthalmic signs such as proptosis, diplopia, epiphora, and even vision loss.[5,6]

Computed tomography (CT) remains the gold standard diagnostic modality, revealing sharply demarcated, sclerotic, homogenously dense masses that conform to the sinus contours.[5,4]. Due to the potential for orbital or intracranial extension, the presence of symptoms or radiologic evidence of invasion typically necessitates surgical intervention.[5,7]

CASE REPORT

A 46-year-old male presented with a two-year history of slowly progressive protrusion and lateral displacement of the right eye, accompanied by dull periorbital discomfort. There were no complaints of diplopia, visual impairment, headache, or restriction in ocular movements. The patient reported a history of trauma to the right orbit shortly before the onset of symptoms.

On physical examination, a firm, non-tender swelling was palpated over the medial aspect of the right orbit. Anterior rhinoscopy and nasal endoscopy revealed a solitary, smooth-surfaced submucosal mass in the right middle meatus, displacing the uncinate process anteriorly. The nasal septum was deviated to the left with compensatory hypertrophy of the left inferior turbinate. The nasal mucosa was otherwise unremarkable.

Ophthalmologic evaluation showed preserved visual acuity, normal intraocular pressure, and full range of extraocular movements. There was no evidence of diplopia or afferent pupillary defect. Lacrimal system patency was confirmed by lacrimal syringing.

Differential diagnoses for unilateral proptosis included benign orbital tumours (e.g., rhabdomyosarcoma, myeloid sarcoma, osteoma, dermoid cysts), orbital cellulitis, thyroid eye disease (TED), carotid-cavernous fistula, vascular malformations, metastatic lesions (e.g., breast carcinoma), and pseudotumours.

Non-contrast computed tomography (CT) of the paranasal sinuses demonstrated a well-demarcated, hyperdense lesion measuring 34 × 34 × 35 mm originating from the right ethmoid sinus, extending laterally into the orbit. The lesion displaced the orbital contents laterally and abducted the right optic nerve by approximately 2 cm. B-scan ultrasonography showed a heterogeneous hypoechoic lesion arising from the medial orbital wall, causing globe displacement.(Fig 1) No signs of intracranial extension were observed. Thyroid function tests were within normal limits.

The patient was a known hypertensive on Telmisartan 20 mg daily and Amitriptyline 25 mg nightly. There was no family history of similar complaints or hereditary conditions.

Based on clinical and radiologic findings, a diagnosis of right frontoethmoidal osteoma was established. The patient underwent surgical excision of the lesion via a lateral rhinotomy approach under general anaesthesia. Intraoperatively, a dense, ivory-like bony mass was visualized, arising from the ethmoid sinus and extending into the orbit.(Fig 2) The lesion was carefully dissected and removed in toto.

During the procedure, a low-pressure cerebrospinal fluid (CSF) leak was encountered from the ethmoid roof. It was successfully managed using Surgicel® and bone wax. No lumbar drain was required. The patient was monitored for 48 hours postoperatively; no further CSF leak was noted.

The postoperative period was uneventful. The patient demonstrated complete resolution of proptosis, with preserved visual acuity and full ocular mobility at follow-up. Histopathological examination confirmed the diagnosis of an ivory-type osteoma, characterized by dense lamellar bone without evidence of malignancy.

DISCUSSION

Frontoethmoidal osteomas are relatively uncommon, with incidental detection rates of approximately 0.014–0.43% on CT scans. [1,2]They tend to affect males more often than females (ratio ~2:1) and most frequently occur in middle-aged adults.[3,5]The ethmoid sinus, owing to its limited space, predisposes to earlier symptom onset compared to the

more capacious frontal sinus.[3]

The etiopathogenesis remains poorly understood but likely multifactorial. Proposed mechanisms include embryologic misplacement of cartilaginous rests, reactive bone proliferation following trauma or chronic inflammation, and genetic predispositions. Gardner's syndrome is a notable genetic condition associated with multiple osteomas.[8,9]

Small osteomas are usually asymptomatic; however, as they enlarge, particularly beyond 30 mm, they may cause symptoms due to mass effect or obstruction of sinus drainage.[2] Headaches and facial pressure are common and often prompt imaging.[5] Orbital extension, though rare, can result in proptosis, diplopia, extraocular muscle displacement, epiphora, or even orbital cellulitis or emphysema in severe cases. [6,10]Intracranial invasion may lead to cerebrospinal fluid (CSF) leak, meningitis, brain abscess, or pneumocephalus.[2,6,7]

CT scanning is paramount in diagnosis and surgical planning, demonstrating a dense, well-circumscribed lesion conforming to the sinus walls.[4,5]Magnetic resonance imaging may assist in differentiating tissue planes and evaluating soft tissue or orbital involvement.[5]

Radiologic and clinical differentials include fibrous dysplasia, osteoblastoma, ossifying fibroma, osteoid osteoma, and, in rare cases with unusual features, even malignancies.[5,10]

Indications for surgery include symptomatic cases (e.g., proptosis, visual disturbance), lesions exceeding 30 mm, and any evidence of orbital or intracranial extension.[5,7] Conservative management with periodic imaging may be reasonable for small, asymptomatic lesions stable in size.[3]

Surgical approach depends on lesion size, location, and extension:
Endoscopic Endonasal Approach: Preferred for small osteomas confined to sinus cavities without significant orbital or intracranial involvement, particularly in the ethmoidal region.[4,5,11]

External Approaches: A lateral rhinotomy, Lynch–Howarth incision, or external frontoethmoidectomy may be necessary for larger lesions or those with orbital/intracranial extensions. [5,6,7]In extensive cases, combined open and endoscopic methods enable complete excision while minimizing morbidity.[7,12]

The choice aims to balance complete tumour removal and minimization of morbidity and cosmetic disruption.

Intraoperative challenges may include CSF leakage, particularly if the osteoma abuts or breaches the anterior cranial fossa. Prompt repair using dural sealants or bone wax, as well as careful reconstructive techniques, are essential to prevent postoperative complications.[5]

Complete surgical excision typically yields excellent outcomes, with resolution of proptosis and preservation of visual function. Histology often confirms ivory-type osteoma composed of dense, lamellar bone. Recurrence is rare but can occur with incomplete resection. Regular postoperative surveillance using imaging at defined intervals is advisable to monitor for recurrence. [7,11]

CONCLUSION

This case underscores the importance of considering paranasal sinus osteomas in the differential diagnosis of chronic, progressive unilateral proptosis. Surgical excision provides both definitive diagnosis and symptom resolution, with excellent prognosis when appropriately managed.

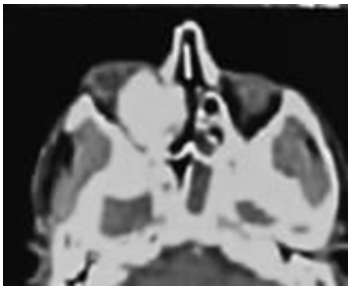

Fig 1- Axial CT Image showing osteoma esncroaching the orbit

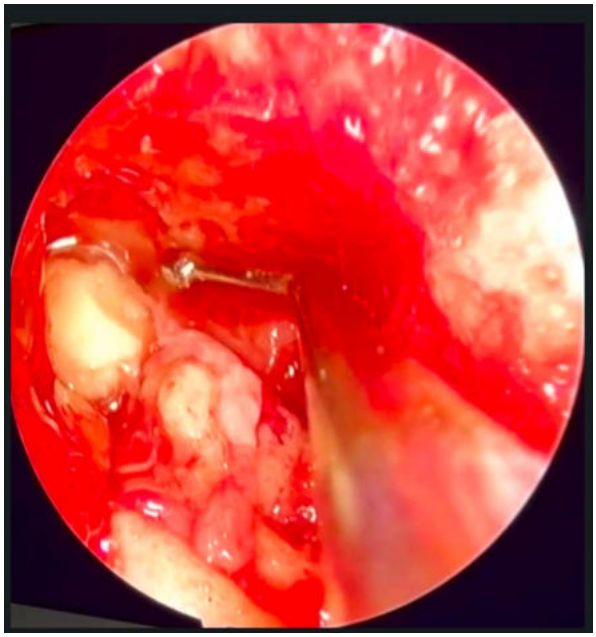

Fig 2-Endoscopic image showing osteoma lateral to ball probe tip.

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