A Large Ethmoido-orbital Osteoma Presenting With Epiphora in an 11-Year-Old Boy

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INTRODUCTION

Osteomas are the most common benign tumors of the paranasal sinuses, which often involve the orbit and its contents. They are found in decreasing frequency in the frontal, ethmoidal, and maxillary sinuses. Osteomas usually are asymptomatic and are discovered incidentally during a routine radiographic examination unless they block the drainage of the sinus or impinge on the orbital, lacrimal, or intracranial contents. This article presents a case of a large ethmoido-orbital osteoma that caused epiphora and facial asymmetry but no diplopia, and was excised en bloc via an external ethmoidectomy approach.

CASE REPORT

An 11-year-old boy presented with recent onset of left proptosis, slight facial asymmetry, and epiphora noted after a fall during a school trip. He reported tearing of the left eye for at least a year. There were no complaints of headache, visual disturbances, or sinus-related symptoms.

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Figure 1: Axial CT showing a bony mass expanding out of the ethmoid sinus into the orbit with compression of the globe and medial rectus muscle (A) and a bony mass extending into the base of the left frontal sinus and superior portion of the left orbit (B).

On physical examination, there was slight facial asymmetry with the left eye deviated superolaterally. Left proptosis was evident with lateral displacement of the globe. Both eyes had no sign of irritation, with clear optic media and normal fundi. No sign of external pressure was noted on examination of the retina in the left eye. Visual acuity was 6/6 without any correction, and the peripheral visual field was normal in both eyes. There was good ocular movement with no limitation in any field of gaze. Cover test was normal, and no phoria or tropia was present. On attempted irrigation of the lacrimal system, an obstruction to flow was evident at the level of the lacrimal sac.

Axial computed tomography of the head showed an extremely dense bony mass situated in the left frontal and ethmoid sinuses, expanding into the medial aspect of the left orbit with signs of pressure on the globe and displacement of the medial rectus muscle. The optic nerve and intraorbital vessels appeared normal (Figure 1).

The patient was admitted for excision of the osteoma. Surgery was performed by a joint team of ophthalmologic and otorhinolaryngologic surgeons. A traditional external ethmoidectomy approach was used. A 3-cm curvilinear incision was made halfway between the inner canthus and the anterior aspect of the nasal bones, and the periosteum over the frontal process of the maxilla was incised and ele-
vated to expose the medial wall of the orbit.

The osteoma was visualized at this point. The anterior portion was mobilized using a chisel and drill. A sharp demarcation line was present between the tumor and normal bone. The tumor was separated from the lacrimal sac. The osteoma was fragmented to minimize trauma to the contents of the orbit and removed en bloc (Figure 2). The globe was inspected periodically during the procedure to assess perfusion of the retina and its general well-being. Histopathologic inspection showed a large, ivory-type osteoma.

Immediately after surgery, the epiphora ceased. The patient complained of diplopia, which lasted for 2 weeks. On the third week, no subjective or objective signs of diplopia were present. Ocular movements were normal in all directions of gaze and there was no limitation on abduction or adduction. Visual acuity was retained, and the patient was pleased with the cosmetic results of the surgery.

**DISCUSSION**

Paranasal sinus osteomas are most commonly found in the frontal sinus (80%) and the ethmoid sinus (16%), with the remainder found in the maxillary sinus. Isolated cases of sphenoid sinus osteomas have been documented.1,2

Ethmoid osteomas extend slowly into the orbit, adjacent the frontal sinus, or both. Among 740 tumors of the orbit in one series, only 38 were osteomas.4 These benign tumors are found more frequently in men than in women. The etiology of osteomas is debated; the most common theories accepted are embryologic, traumatic, and infectious. A combination of the developmental and traumatic theories is presently the most widely accepted theory.5

Osteomas usually occur sporadically but may occur as part of a syndrome, as in tuberous sclerosis1 or Gardner's syndrome (intestinal polyposis, bone lesions, and multiple cutaneous and subcutaneous lesions). Most osteomas are asymptomatic and are discovered as an incidental finding on routine radiographs. The radiographic appearance of an osteoma is characterized by dense and sharply defined margins. Alternatively, they may be discovered as a result of secondary sinus disease or intraorbital or intracranial complications due to extension into adjacent anatomical structures. Ethmoid osteomas may cause nasolacrimal obstruction.6

Figure 2: A large ethmoido-orbital osteoma after excision (5×3.5 cm).

The complications and ocular symptoms are related to the size and location of the tumor. Damage is caused by mechanical pressure and not by structural invasion or infiltration. The displacement of the globe varies with the direction and degree of the tumor expansion. The cosmetic deformity is thus caused by ocular displacement within one orbit relative to the position of the eye in the other orbit. Double vision is seldom found on clinical examination and is usually present only if a very large, rapidly growing tumor is within the orbit. As most osteomas grow and slowly progress, there is no diplopia unless a mechanical restriction to ocular movement is created within the orbit.

Other less common orbital complications of ethmoido-orbital osteomas include orbital emphysema, orbital cellulitis,7 and acquired Brown syndrome.8 Growth of the tumor superiorly may cause cerebrospinal fluid leakage, meningitis, pneumocele, or brain abscess.

Histologically, three basic types of osteomas have been described. The ivory or eburnated type is the most common type of osteoma to involve the orbit and consists of solid bone without haversian canals. It appears as a uniform, radiopaque structure. The compact form is similar to the ivory osteoma except the interior has haversian canals with concentric lamellae...
of bone formation. The cancellous type (osteoma spongiosum) is primarily connective tissue with large areas of new bone formation.\textsuperscript{12}

No consensus exists on when surgical intervention is warranted. Mauriello\textsuperscript{12} suggests excision should be reserved only for symptomatic osteomas; thus, surgical removal should be considered when cosmetic deformity is present in association with chronic sinusitis, mucocele formation, or epiphora. Ethmoid osteomas with persistent headache, regardless of size, should be excised after all other causes of headache have been excluded.\textsuperscript{3}

The surgical approach used to excise an osteoma should be based on the tumor size and location. Ethmoid and ethmoido-orbital tumors are approached either by external ethmoidectomy or anterior orbitotomy (extra-periosteal orbitotomy). The anterior orbitotomy approach to ethmoido-orbital osteomas should be chosen if the tumor is judged to be mainly anterior to the equator of the eye and may require temporary removal of the bony wall of the orbit.\textsuperscript{10} In the case presented, the external ethmoidectomy approach was chosen because the tumor was posterior to the equator of the eye and it was believed this surgical technique would enable better visualization and safer removal of the large tumor.

With ethmoidal or ethmoido-orbital surgery, caution should be exercised to avoid damage to the lacrimal apparatus, the trochlea of the superior oblique muscle, and the anterior and posterior ethmoidal arteries. It should be noted that endoscopic sinus surgery may offer a convenient alternative to open procedures in select cases of ethmoid or ethmoido-orbital osteoma.\textsuperscript{9} Maxillary sinus osteomas are excised via the Caldwell-Luc approach. Most osteomas of the frontal sinus are best approached by an osteoplastic flap.\textsuperscript{15}

\section*{CONCLUSION}

Osteomas are the most common benign tumor of paranasal sinuses that invade the orbit. They usually are found as an incidental radiographic finding. When they enlarge, osteomas may cause a number of intraorbital, intracranial, and lacrimal complications. Long-standing monocular epiphora suggests the possibility of an ethmoido-orbital osteoma. A multidisciplinary approach is suggested for ethmoido-orbital surgery consisting of ophthalmologic as well as otolaryngologic consultation.

\section*{REFERENCES}