Dermoid Cyst of the Orbit and Frontal Sinus: A Case Report

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ABSTRACT

We describe a case of a dermoid cyst involving the orbit and frontal sinus of an adult treated at our tertiary referral center, and we review the literature on dermoid cysts of the orbit and frontal sinus. A 28-year-old Caucasian man presented with right-sided supraorbital swelling resulting in diplopia and reduced visual acuity. Computed tomography and magnetic resonance imaging scans were preformed. Although a definitive diagnosis was unclear, the imaging findings were consistent with a dermoid cyst. The lesion was excised through an upper-lid incision. Postoperatively, the patient had a patent frontal sinus and his visual symptoms resolved. Dermoid cysts of the orbit are uncommon lesions that occur primarily in the pediatric population. Lesions extending into the frontal sinus have not been reported before in the literature. In adults, orbital dermoids are more likely to present with bone erosion, and therefore they should be considered in the differential diagnosis for orbital and frontal bone lesions extending into the frontal sinus.

KEYWORDS: Dermoid cyst, frontal sinus, orbit, paranasal sinus

Dermoid cysts are benign choristomas. In the pediatric population, they often present in the periorbital region. They are generally divided into deep and superficial lesions with deep lesions presenting later in life.¹ We present the unusual case of a 28-year-old man with a deep intraorbital dermoid cyst extending into the frontal sinus.

CASE REPORT

A 28-year-old man presented with a 4-month history of right-sided painful supraorbital swelling. He reported experiencing double vision worsening over several months as well as inferior and lateral displacement of his eye. His medical history was significant for a frontal

sinus "tumor" of unclear etiology diagnosed several years before. He also had a history of being struck in the forehead with a crowbar 15 years prior to presentation. He had received no treatment for this injury. The ophthalmic exam revealed horizontal diplopia with an intraocular pressure of 21 mm Hg on the right (affected eye) and 16 mm Hg on the left. Visual acuity was 20/50 on the right 20/20 on the left.

Computed tomography (CT) revealed a 15 × 12-mm lesion, superior and medial to the right globe, isodense to brain (+26 Hounsfield units) in the orbit, extending through the orbital roof into the frontal sinus (−35 Hounsfield units), the latter suggesting a fatty component (Figs. 1 and 2). Magnetic resonance imaging (MRI) T1-weighted images revealed an isointense mass

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Figure 1 Axial noncontrast computed tomography shows an isodense mass superior medial to the right globe.

in the right orbit, again extending through the orbital roof and forming a hyperintense mass in the frontal sinus, the latter again suggesting fat (Figs. 3 and 4).

Surgical excision was performed using a medial upper-eyelid incision. The skin and pretarsal orbicularis muscle were incised, and the mass was immediately visible. The mass was freed circumferentially with blunt dissection from the periorbital soft tissues. The periosteum around the bony defect was incised to free the portion of the mass extending superiorly into the frontal sinus. After removal of the mass, a curette and a cutting drill were used to thoroughly remove any residual

Figure 2 Axial noncontrast computed tomography shows the fat density of the mass as it enters into the right frontal sinus.

Figure 3 T1-weighted coronal image shows the connection of the orbital to the frontal mass.

tumor. The frontal sinus cavity was entered and clearly visualized (Fig. 5). The frontal recess appeared to be uninvolved. A titanium mesh sheet was cut and molded onto a sterile, stereolithographic skull model used as a bending template. The plate was then inserted through

Figure 4 A coronal T1-weighted image shows the isodense right orbital mass (arrow), with its hyperintense component in the frontal sinus (arrow head), which showed suppression with fat suppression images (not shown).

Figure 5 Intraoperative photograph after resection of the dermoid cyst. The orbital roof defect communicating with the frontal sinus is clearly visible.

the incision to separate the orbital contents from the frontal sinus. It was secured to the superior orbital rim with one 5-mm titanium screw. Pathological analysis revealed an epithelial lining with sebaceous glands and vellus hairs. The cyst contained lipid and keratin debris, consistent with a dermoid cyst. Postoperatively, the patient's pain and diplopia resolved completely. The incision healed with good aesthetic results (Fig. 6). His visual acuity improved to 20/20 in the affected eye and tonometry returned to normal (14 mm Hg).

DISCUSSION

Dermoid cysts occur in three primary locations in the head and neck: the frontotemporal region, the periorbital region, and the nasoglabellar region.² These sites lie at the confluence of the surgical expertise of otolaryngologists, neurosurgeons, plastic surgeons, and ophthalmologists. At times, this calls for a multidisciplinary approach to resection. Ours is a rare case of an

Figure 6 Photograph 1 month after surgery. Incision is completely healed with minimal scar. Diplopia and hypophthalmos are resolved.

orbital dermoid extending into the frontal sinus, a finding that has not been previously described in the English language literature. In general, these lesions present in childhood. When they occur deep within the orbit, they may escape diagnosis until adulthood when they present with ophthalmologic symptoms as well as erosion of nearby bony tissues.

Dermoid cysts are a subset of benign heterotopic neoplasms termed *choristomas* and account for up to 9% of pediatric orbital tumors.¹ Etiologically, they are thought to derive from dermal and epidermal tissues trapped in the cranial fusion lines as the neural tube closes in embryogenesis.³ Histologically, they have a lining of squamous epithelium with dermal elements such as hair follicles, sebaceous, and sweat glands. Within the cyst, keratin, hair, smooth muscle, and lipid debris can be found.

When dermoids occur in the periorbital region, anterior lesions are diagnosed early. They tend to present as soft tissue swelling in the eyelid anterior to the frontozygomatic suture line. Due to this location, they are generally diagnosed in early childhood. Deeper orbital dermoids are rare and grow indolently, presenting in the teenage years and beyond.^{1,4}

Pryor et al reviewed 49 cases of pediatric dermoid cysts and found the periorbital region to be the most common. Their study showed that 61% of cases presented periorbitally. Midline nasal and forehead dermoids accounted for only 16% of cases. Within the periorbital region, the lateral orbit (adjacent to the lateral canthus) was the most common location. The medial canthus was the second most common location. This corresponds to the frontozygomatic and the frontal-ethmoidal sutures, respectively.⁴

Chawda and Moseley reviewed the CT images of 160 patients with orbital dermoids. The majority of their patients were adults, with a mean age of 28. The older patient age was an unusual finding as orbital dermoids are generally tumors of childhood. They attributed this finding to the fact that the majority of pediatric lesions occur superficially and therefore fewer patients received preoperative imaging. The majority of their cases had a well-defined cyst wall with a central low-density region. However, calcifications and heterogeneity within the cyst can also be seen.⁵

Deep lesions are more likely to present with adjacent bony changes. Nugent et al reviewed 17 CT scans of orbital dermoids. Eleven of 13 patients with deep orbital dermoids showed thinning or notching of adjacent bone. In three patients, the bony lesion eroded through the full thickness of the adjacent bone.⁶ The MRI appearance is variable and depends on the specific contents of the cyst. If there is lipid material within the cyst, it will appear hyperintense on T1-weighted imaging. Cysts containing higher levels of protein can appear hyperintense on both T1 and T2 imaging.

Complete surgical excision is curative. An upper-eyelid incision provides adequate exposure of most orbital lesions.² Lesions invading deeply within the orbit may require a more aggressive approach. Craniotomy and neurosurgical involvement may be required for intracranial extension. A bicoronal approach may be required for exposure if there is extensive involvement of the frontal sinus.

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