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Case Report

Large pediatric sphenoid sinus cholesterol granuloma: Case report and review of the literature

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ABSTRACT

Cholesterol granulomas are rare lesions in the paranasal sinuses, especially in children. Symptoms are nonspecific depending on the localization and extent of the mass. In a 6-year-old boy who presented with a headache and proptosis, computed tomography and magnetic resonance imaging showed a large expansile mass in the nasal cavity. The patient was started on intravenous antibiotics with no improvement. Following endoscopic biopsy, the mass was removed. Pathological findings were consistent with a cholesterol granuloma. Good clinical outcomes can be obtained with proper imaging studies. Endoscopic sinus surgical techniques allow the surgeon to clear and drain the affected sinus cavity.

1. Introduction

Cholesterol granulomas are intraosseous cysts contained within a thick fibrous capsule. A cholesterol granuloma is formed through a foreign-body giant-cell reaction to cholesterol deposits, with associated fibrosis and vascular proliferation. Manasse [1] was the first to describe the foreign-body giant-cell reaction to the cholesterol crystals that were thought to cause cholesterol granulomas in the middle ear. Obstruction of the air cell system within the aerated bone is thought to lead to reduced intracavity pressure. Subsequent mucosal inflammation, edema, angiogenesis, and rupture of blood vessels result in accumulation of cholesterol crystals from hemoglobin breakdown [2].

Cholesterol granulomas are the most common lesion in the petrous apex, less common in the orbit, and uncommon in the paranasal sinuses. The most common site in the paranasal sinuses is the maxillary sinus. Cholesterol granuloma of the sphenoid sinus has rarely been reported. Symptoms of cholesterol granulomas are usually related to the pressure effect on the adjacent structures [3–5]. Patients may present with symptoms related to direct pressure on adjacent anatomical structures, for example, headaches, cranial nerve signs (V, VI, VII, or VIII), or gradual loss of vision. Other patients are asymptomatic and the diagnosis is made by incidental finding on radiological imaging. Imaging plays a key role in diagnosis of cholesterol granuloma. These lesions are expansile and erosive on computed tomography (CT), with well-defined margins, though they are difficult to distinguish from other lesions, such as epidermoids and mucoceles, using this modality. Magnetic resonance imaging (MRI) provides greater specificity for cholesterol granulomas as they present with high intensity in both T1- and T2-weighted sequences [6].

Cholesterol granulomas of the paranasal sinuses have been described but are less common than their counterparts in the temporal bone [7–9]. Furthermore, pediatric cholesterol granulomas in the paranasal sinuses have rarely been described; we found only one case report in the literature of a cholesterol granuloma in the maxillary sinus in a child via Pubmed search using the terms cholesterol granuloma, sinus, pediatrics, and headache accessed on April 30, 2013 [10]. Here we report a rare case of a pediatric cholesterol granuloma originating from the sphenoid sinus in which endoscopic surgical techniques ultimately led to the resolution of symptoms. The Drexel University College of Medicine Institutional Review Board granted a waiver for this study.

2. Case report

A 6-year-old boy with a history of asthma initially presented to the otolaryngology office with a 2-month history of snoring and nasal congestion. The patient's family was advised to follow up

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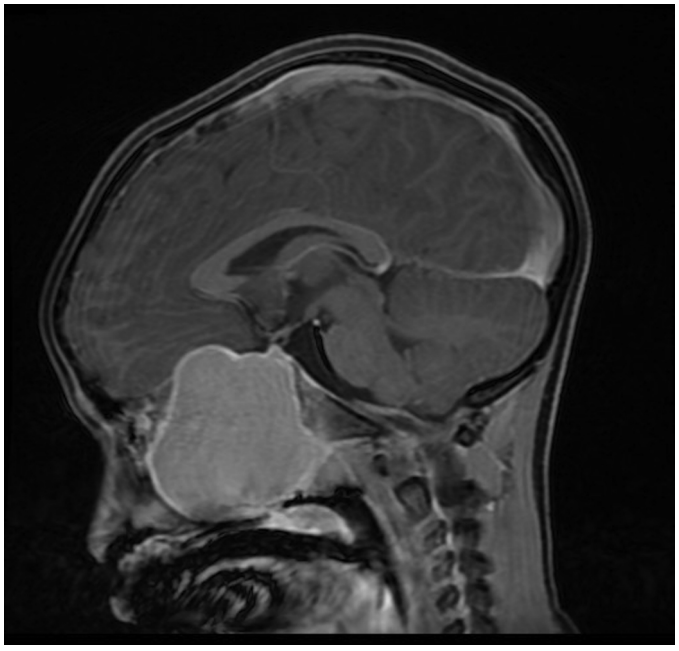

Fig. 1. Sagittal post-contrast T1-weighted images demonstrate the T1-hyperintense lobulated mass, centered in the nasopharynx with extension into the anterior cranial fossa.

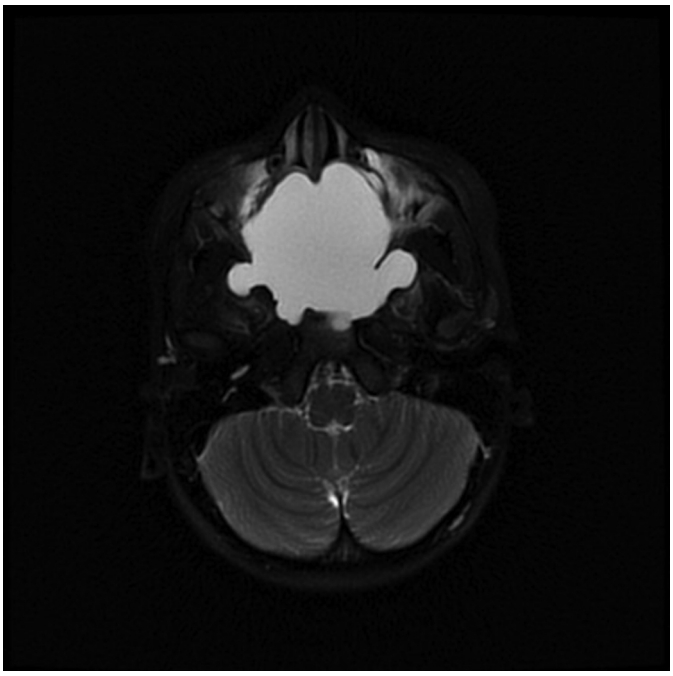

Fig. 2. Axial T2-weighted images demonstrate the T2-hyperintense lobulated mass, centered in the nasopharynx with extension into the anterior cranial fossa.

after a polysomnogram. However, the patient presented 1 month later at an outside hospital emergency department for intermittent headaches, "electrical shocks" down the left side of his body, and bulging eyes. Questioning revealed a history of head trauma 1 year previously when the patient was involved in a motor vehicle accident. The report from the outside, non-contrast-enhanced head CT scan noted that the patient had a 6.0 cm × 5.0 cm mass in the nasopharynx involving the sphenoid and frontal sinuses, extending up to the base of the skull with bony erosion and mass effect on the orbits. He was transferred to St. Christopher's Hospital for Children, a tertiary care pediatric hospital, for further care.

The patient was afebrile, awake, alert, and cooperative, with obvious proptosis of both eyes. Neurosurgical and ophthalmology consultations did not reveal any deficits. Routine complete blood count, complete metabolic panel, and urinalysis findings were unremarkable. MRI of the brain and face with and without contrast enhancement, showed a circumscribed, lobulated, expansile lesion measuring 6.8 cm × 5.9 cm × 6.0 cm centered within the nasal cavity (see Figs. 1 and 2). The lesion extended into the region of the anterior cranial fossa and occupied the entire nasopharynx. The mass was hyperintense on both T1- and T2-weighted sequences with no internal enhancement, suggesting that the mass contained proteinaceous fluid (Figs. 1 and 2). The lesion extended into the inferior aspect of the anterior cranial fossa, exerting mass effect on the intracranial internal carotid arteries and inferior frontal lobes. The dura appeared intact and the underlying brain parenchyma of the frontal lobes was otherwise normal in signal and morphology. Further imaging included a non-contrast-enhanced maxillofacial CT scan following the BrainLab (Feldkirchen, Germany) protocol in preparation for surgical intervention.

On hospital day 5, endoscopic biopsy was performed and the sinus mass was removed under BrainLab image guidance. Oxymetazoline 0.05%-soaked pledgets were placed in the right and left nasal cavities. After the pledgets were removed, a 0° endoscope placed into the right and left nasal cavities enabled visualization of a large mucosal mass located 1 cm posterior to the inferior turbinates (Fig. 3). Next, 0.5 mL of 1% lidocaine with 1:100,000 epinephrine was injected in the right and left side of the mass. A through-cutting instrument was then used to take biopsies of the mass. Once the instrument penetrated the inner mucosal wall, brown, turbid fluid started to flow out of the mass. These specimens were sent for pathologic, cytologic, and microbiologic analysis, respectively. Inside the mass, the internal carotid arteries, optic chiasm, sella turcica, and brain were visualized and confirmed with the BrainLab image guidance system (see Figs. 4 and 5). A microdebrider was then used to marsupialize the mucosal mass, moving posteriorly toward the internal carotid arteries and superiorly toward the skull base and making sure to leave mucosa on the dura, carotid arteries, and optic chiasm. A dissolvable postoperative nasal dressing was used after the mass was sufficiently decompressed and marsupialized. The patient was extubated and transferred to the pediatric intensive care unit in stable condition.

Postoperative CT scan of the brain and sinus showed resection of the sphenoethmoidal mass with no pneumocephalus or herniation of cranial contents. On cytological and pathological examination, the mass showed rare epithelial cells with atypical lymphocytes, respiratory mucosa with foreign-body giant-cell reaction to cholesterol, and occasional eosinophils, with no evidence of a mucocele or malignancy (Fig. 6a–d). Combined with the radiological and clinical findings, this was suggestive of

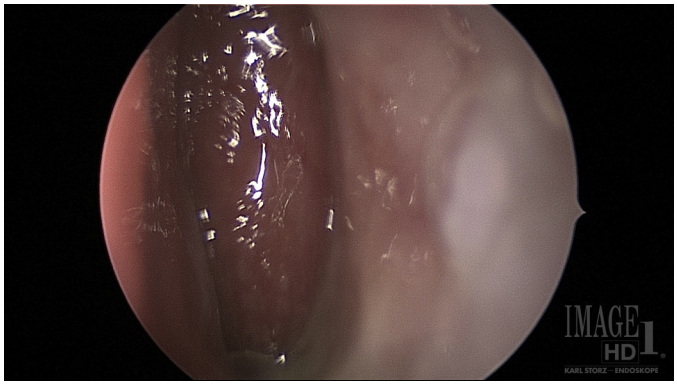

Fig. 3. Endoscopic examination of sinonasal mass in a 6-year-old male.