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Case Report

Cholesterol granuloma of the sphenoid sinus

Bo-Nien Chen[1,2], Ying-Piao Wang[3,4]

[1]Department of Otolaryngology-Head and Neck Surgery, Hsinchu MacKay Memorial Hospital, Hsinchu, Taiwan; [2]Mackay Junior College of Medicine, Nursing, and Management, New Taipei, Taiwan; [3]Department of Otolaryngology-Head and Neck Surgery, MacKay Memorial Hospital, Taipei, Taiwan; [4]Department of Audiology and Speech Language Pathology and School of Medicine, Mackay Medical College, New Taipei, Taiwan

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Abstract: Objectives: Cholesterol granuloma of the sphenoid sinus has rarely been reported. Methods: A 50-year-old man visited our hospital presenting with a 2-year history of intermittent right-sided headache, 1-month history of right-sided tinnitus, and 5-year history of nasal obstruction and purulent nasal discharge. Computed tomography revealed a well-demarcated expansile mass in the right sphenoid sinus with perifocal bony erosion and almost complete dehiscence of the lateral wall of the right sphenoid sinus. The patient subsequently underwent endoscopic sphenoid sinusotomy guided by a navigation system. Results: After surgery, the patient was diagnosed with cholesterol granuloma of the sphenoid sinus. The patient's symptoms improved, and no complications were reported. Conclusions: Cholesterol granuloma is extremely rare and should be considered in the differential diagnosis of an expansile mass in the sphenoid sinus. Endoscopic sphenoid sinusotomy guided by a navigation system is a safe and effective treatment for cholesterol granuloma of the sphenoid sinus.

Keywords: Cholesterol granuloma, sphenoid sinus, endoscope, sinusotomy, navigation

Introduction

Cholesterol granuloma (CG) was first described in the peritoneum in 1893 and has thereafter been reported in numerous locations including the mastoid bone, middle ear cavity, petrous apex, paranasal sinuses, orbitofrontal bone, and petroclival region [1-3]. The middle ear cavity is the most common site for CG. Paranasal sinuses are uncommon sites for CG, of which the maxillary sinus is the most frequent site. CG of the sphenoid sinus has rarely been reported [4-6]. Herein, we present a case of CG of the sphenoid sinus.

Case report

A 50-year-old man visited our hospital presenting with a 2-year history of intermittent right-sided headache, 1-month history of right-sided tinnitus, and 5-year history of nasal obstruction and purulent nasal discharge. He had no history of nasal trauma or surgery. His neurological examination was normal. Sinoscopy revealed bilateral chronic rhinosinusitis with nasal polyps and copious mucopus. Pneumatic otoscopy revealed right-sided otitis media with effusion. Computed tomography (CT) of the paranasal sinuses revealed a 4.6 × 3.5 × 2.6-cm well-demarcated expansile mass in the right sphenoid sinus with perifocal bony erosion and almost complete dehiscence of the lateral wall of the right sphenoid sinus (**Figure 1**). The patient subsequently underwent endoscopic sphenoid sinusotomy guided by a navigation system. During surgery, a brownish oil-like fluid flowed out after cutting the anterior wall of the right sphenoid sinus (**Figure 2A**). The anterior wall of the right sphenoid sinus was opened and widely marsupialized (**Figure 2B**). All contents of the right sphenoid sinus were evacuated through suction and irrigation with saline (**Figure 2C**). Subsequently, erosion of the lateral wall of the right sphenoid sinus with pulsation dura was clearly visible.

Postoperatively, the histopathological sections of the lesion revealed an aggregate of cholesterol crystals surrounded by foreign body giant cells and granulation tissue. In addition, abun-

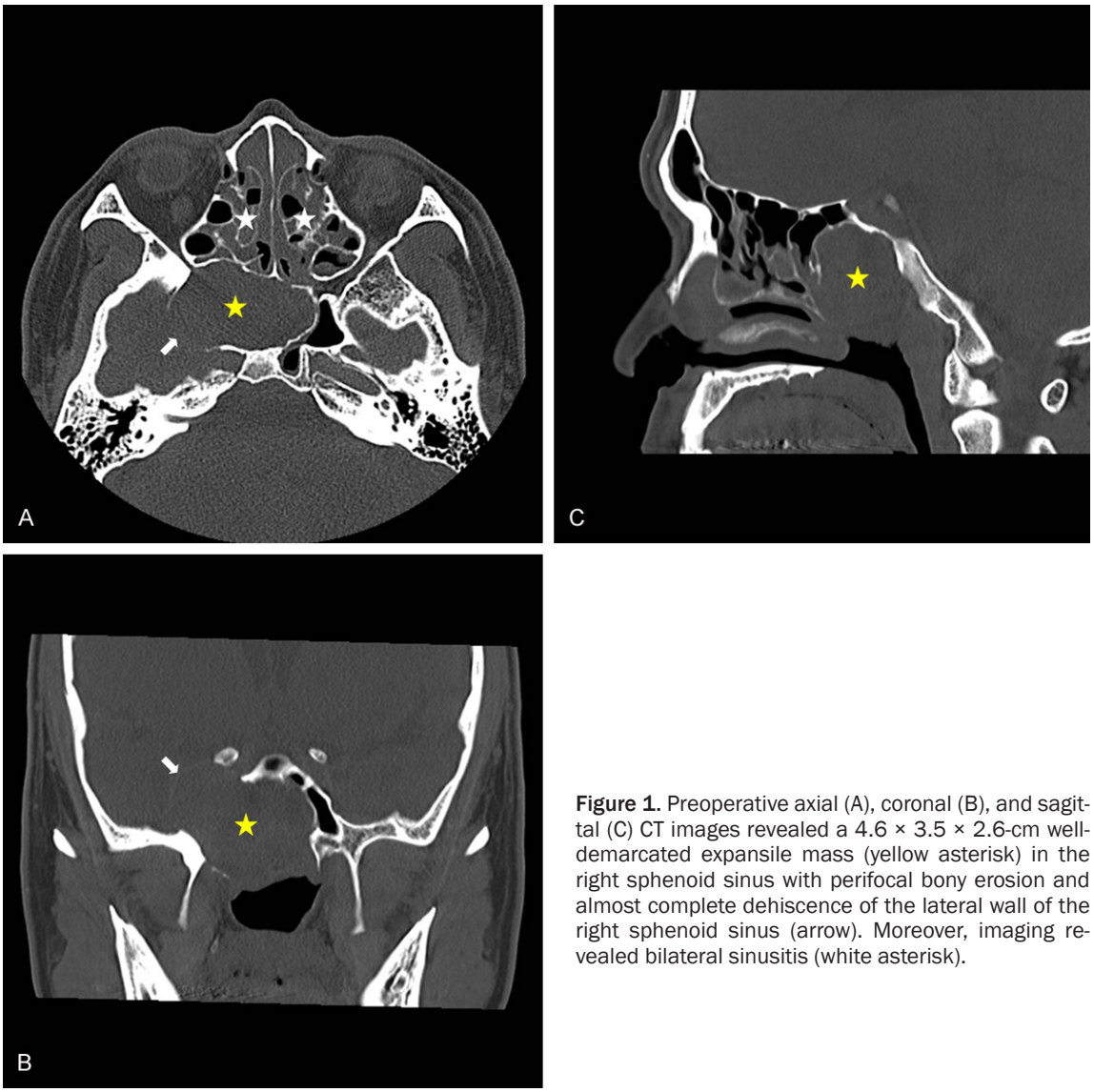

Figure 1. Preoperative axial (A), coronal (B), and sagittal (C) CT images revealed a 4.6 × 3.5 × 2.6-cm well-demarcated expansile mass (yellow asterisk) in the right sphenoid sinus with perifocal bony erosion and almost complete dehiscence of the lateral wall of the right sphenoid sinus (arrow). Moreover, imaging revealed bilateral sinusitis (white asterisk).

dant foamy histiocytes and erythrocytes were found (**Figure 3**). Thus, the patient was diagnosed with CG of the sphenoid sinus.

After surgery, the patient's symptoms improved, and no complications were reported. Effective evacuation of the contents of the right sphenoid sinus and an open drainage tract from the sphenoid sinus were confirmed endoscopically 6 months after surgery (**Figure 2D**).

Discussion

CG of the sphenoid sinus is extremely rare. To date, seven cases of CG of the sphenoid sinus have been reported in the English language literature [4-9].

The pathogenesis of CGs has conventionally been explained by the obstruction–vacuum and exposed marrow hypotheses [2]. Following ventilatory obstruction and a lack of drainage of the pneumatized bony cavity, air is reabsorbed inside the obstructed cavity, and negative pressure is created, causing hemorrhage or exudation. CGs result from a foreign body reaction to hemorrhage, including its byproducts and cholesterol particles from erythrocyte cell membranes. Cholesterol crystals are insoluble, causing precipitation and subsequent formation of granulation tissue [1, 3-6]. The granulomatous lesion is cystic with a fibrous capsule and is often filled with a viscous, brown, or yellow fluid [2].

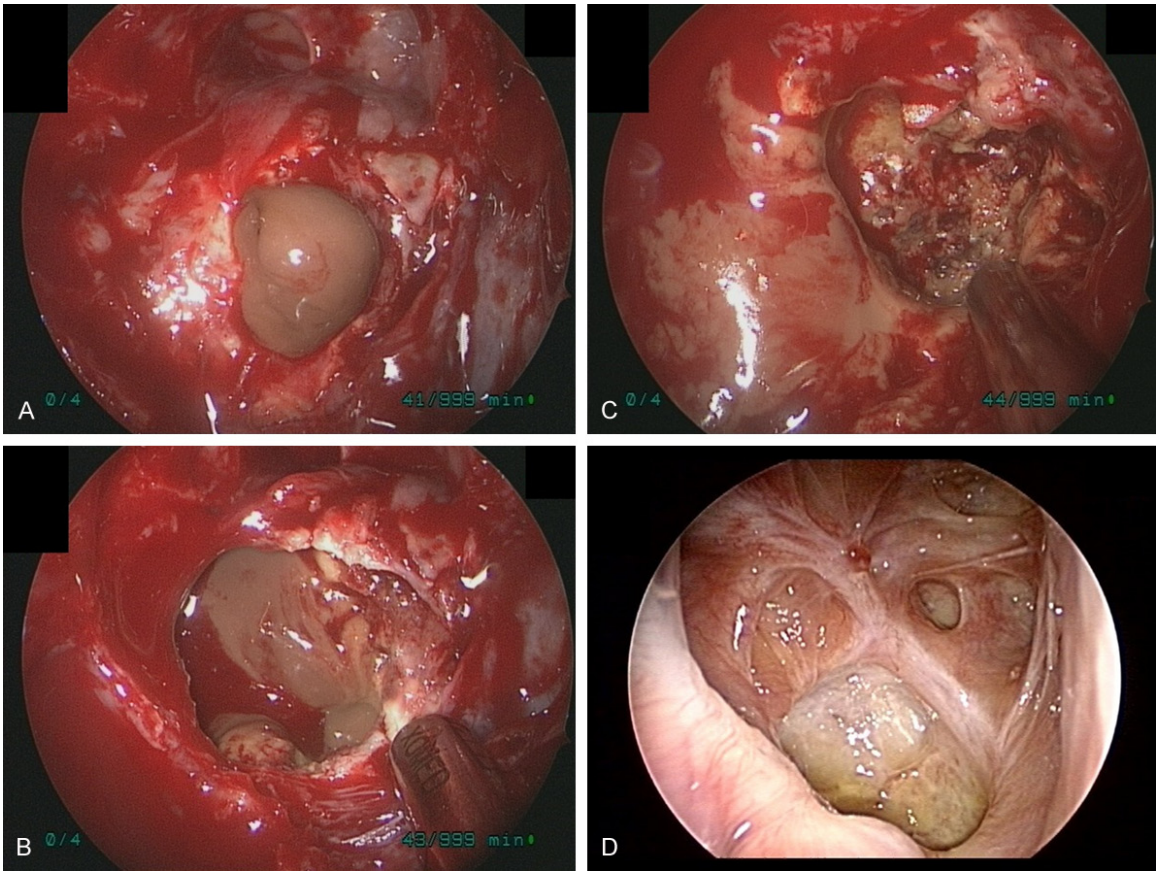

Figure 2. A: A brownish oil-like fluid flowed out after cutting the anterior wall of the right sphenoid sinus. B: The anterior wall of the right sphenoid sinus was opened and widely marsupialized. C: All contents of the right sphenoid sinus were evacuated through suction and irrigation with saline. D: Effective evacuation of the contents of the right sphenoid sinus and an open drainage tract from the sphenoid sinus were confirmed endoscopically 6 months after surgery.

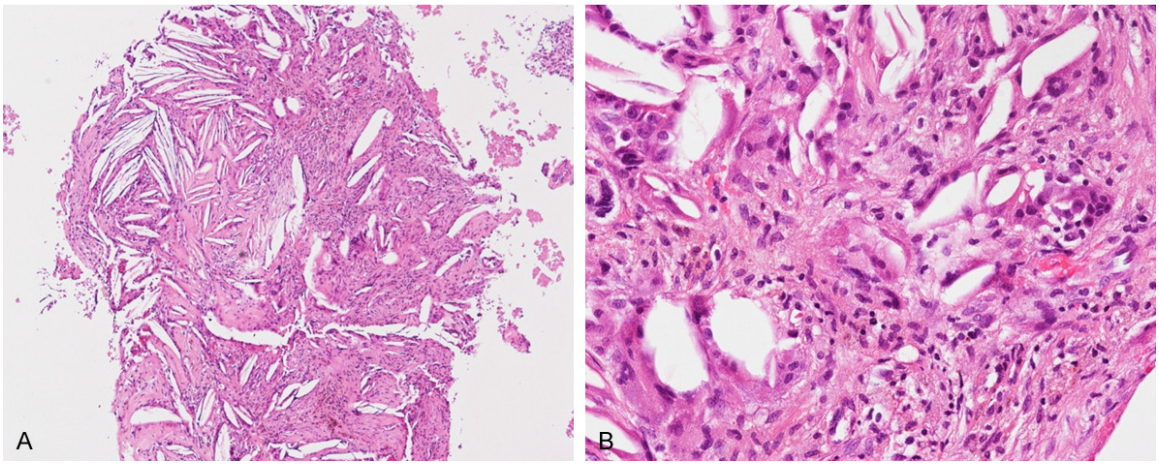

Figure 3. Histopathological sections of the lesion revealed an aggregate of cholesterol crystals (A, hematoxylin and eosin, 40 ×), multinucleated giant cells, foamy histiocytes, and erythrocytes (B, hematoxylin and eosin, 200 ×).

Clinically, CGs often remain asymptomatic until a significant mass effect occurs [2]. The symptoms of CG are usually nonspecific and variable depending on the site of origin. Paranasal sinus

involvement causes various symptoms including facial pain, swelling, headache, diplopia, loss of visual acuity, exophthalmos, nasal obstruction, rhinorrhea, and meningitis [2, 6].

CG and mucocele exhibit the same characteristics on CT; both appear as areas of near-fluid attenuation of expansile lesions with thinning and erosion of the adjacent bone; thus, their differential diagnosis is difficult [5, 6]. However, magnetic resonance imaging (MRI) facilitates differentiating between the two diseases. CG demonstrates hyperintense signals on both T1- and T2-weighted MRI images, whereas mucocele demonstrates hypointense signals on T1-weighted MRI images [2, 4-6].

Treatment of CG of the sphenoid sinus comprises surgical drainage and permanent aeration to prevent recurrence. Because of the lack of a true epithelial lining, total excision of the cyst wall of CG is unnecessary [1-4, 6]. Endoscopic sphenoid sinusotomy is currently considered a safe and effective treatment. Careful preoperative evaluation of the anatomic variations in the sphenoid sinus by using CT and MRI is paramount in patients with CS [2]. Endoscopic sphenoid sinusotomy should be performed under the guidance of a navigation system to confirm the locations of critical adjacent structures [3]. This approach can be safely performed in the setting of chronic rhinosinusitis without an increased risk of intracranial complications [10].

Our case report describes two pertinent points. First, CG is extremely rare and should be considered in the differential diagnosis of an expansile mass in the sphenoid sinus. Second, endoscopic sphenoid sinusotomy guided by a navigation system is a safe and effective treatment for CG of the sphenoid sinus.

Disclosure of conflict of interest

None.

Address correspondence to: Dr. Bo-Nien Chen, Department of Otolaryngology-Head and Neck Surgery, Hsinchu MacKay Memorial Hospital, No. 690, Sec. 2, Guangfu Rd., East Dist., Hsinchu 30071, Taiwan. Tel: +88636119595; Fax: +88636110900; E-mail: chenbonien@yahoo.com.tw

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