

Endoscopic Transrostral- Transsphenoidal Approach to Petrous Apex Cholesterol Granuloma: Case Report

Petroz Apeks Kolesterol Granülomlarına Endoskopik Transrostral-Transsfenoidal Yaklaşım

ABSTRACT

Cholesterol granuloma (CG) of the petrous apex is an inflammatory reaction to the by-products of eroded marrow cavities secondary to chronic obstruction of air cells within the petrous pyramid. We report a case of cholesterol granuloma in the left petrous bone occurring in a 28-year-old woman with an unusual presentation. The woman presented with a 6-month history of intermittent left hemicranial headache and diplopia. CT scan of petrous bone and skull base showed an expansile mass of the left petrous apex. For surgical removal we used the transrostral transsphenoid approach. After surgery, all the symptoms and signs of the patient completely recovered. In this report, the indications and merits of the endoscopic transsphenoidal drainage procedure are illustrated through a case presentation.

KEYWORDS: Abducens palsy, Cholesterol granuloma, Endoscopic transsphenoidal surgery, Petrous apex

ÖZ

Petroz apeksin kolesterol granülomları, petroz piramit içindeki hava hücrelerinin kronik tıkanıklığına bağlı aşınmış kemik iliği kavitesi yan ürünlerine karşı oluşmuş enflamatuar bir reaksiyondur. Bu vaka sunumunda 28 yaşında bir bayan hastada alışılmadık bir klinikle kendini gösteren sol petroz kemikte kolesterol granülomu sunulmuştur. Hasta 6 aydır devam eden aralıklı sol kafa yarısında ağrı ve diplopi ile geldi. Petroz kemiğin ve kafa tabanının bilgisayarlı tomografisi sol petroz apekte yayılım gösteren bir kitle gösterdi. Cerrahi çıkarma için transrostral transsfenoidal yaklaşımı kullandık. Cerrahiden sonra hastanın tüm şikayetleri ve bulguları tamamen düzeldi. Bu yazıda endoskopik transsfenoidal boşaltma işleminin endikasyonları ve yararlılıkları bir olgu sunumu vasıtasıyla gösterilmiştir.

ANAHTAR SÖZCÜKLER: Abdusens palsi, Kolesterol granülomu, Endoskopik transsfenoidal cerrahi, Petroz apeks

Mohammad SAMADIAN¹

Mohsen VAZIRNEZAMI²

Hamid MOGADDASI³

Mohammad RAKHSHAN⁴

Fatemeh KHORMAEE⁵

Haleh ASHRAF⁶

1,2,3,4,5 Shahid Behashti University of
Medical Sciences, Neurosurgery
Department, Tehran, Islamic Republic
of Iran

6 Tehran University of Medical
Sciences, Medicine, Tehran, Islamic
Republic of Iran

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Correspondence address:

Mohammad SAMADIAN

E-mail: swt_f@yahoo.com

INTRODUCTION

Cholesterol granuloma (CG) of the petrous apex is an inflammatory reaction to the by-products of eroded marrow cavities secondary to chronic obstruction of air cells within the petrous pyramid (3,16). These lesions tend to remain clinically silent until encroachment on adjacent cranial nerves causes symptoms like hearing loss, imbalance, facial weakness, and/or diplopia (4).

The treatment for symptomatic petrous apex cholesterol granulomas is surgical drainage, and permanent aeration to prevent recurrence. Numerous surgical approaches to the petrous apex have been described. The ideal surgical approach takes into account the hearing status of the patient and lesion location. Traditional treatment of this lesion can be time consuming and difficult, potentially involve structural damage to the inner ear and facial nerve and added morbidity of an intracranial procedure (1).

Our experience involved the first reported patient of petrous apex CG presenting as contralateral abducens palsy, as well as the incorporation of transrostral transsphenoid surgery to lessen the possibility of damage to structures adjacent to the anterior wall of the sphenoid sinus with preserving the sphenoid sinus function.

CLINICAL PRESENTATION

A 28-year-old woman presented with 6-month history of intermittent left hemicranial headache and diplopia. The patient had no history of head trauma or otologic problem but she had type 1 familial hyperlipidemia. Past surgical history was negative. Physical examination demonstrated right-sided sixth nerve palsy and mild left side hearing loss. The remainder of the exam was unremarkable.

Magnetic resonance imaging (MRI) revealed a large left petrous apex mass abutting the sphenoid sinus. The mass was hyperintense on both T1- and T2-weighted images (Figure 1A,B).

A CT scan of petrous bone and skull base showed an expansile mass of the left petrous apex with bone remodeling of the clivus and skull base (Figure 2), without contrast-induced enhancement.

She was referred to our center for treatment of her skull base lesion. The lesion was separated from the posterior sphenoid sinuses by a thin layer of bone. Wide access to the cyst cavity without

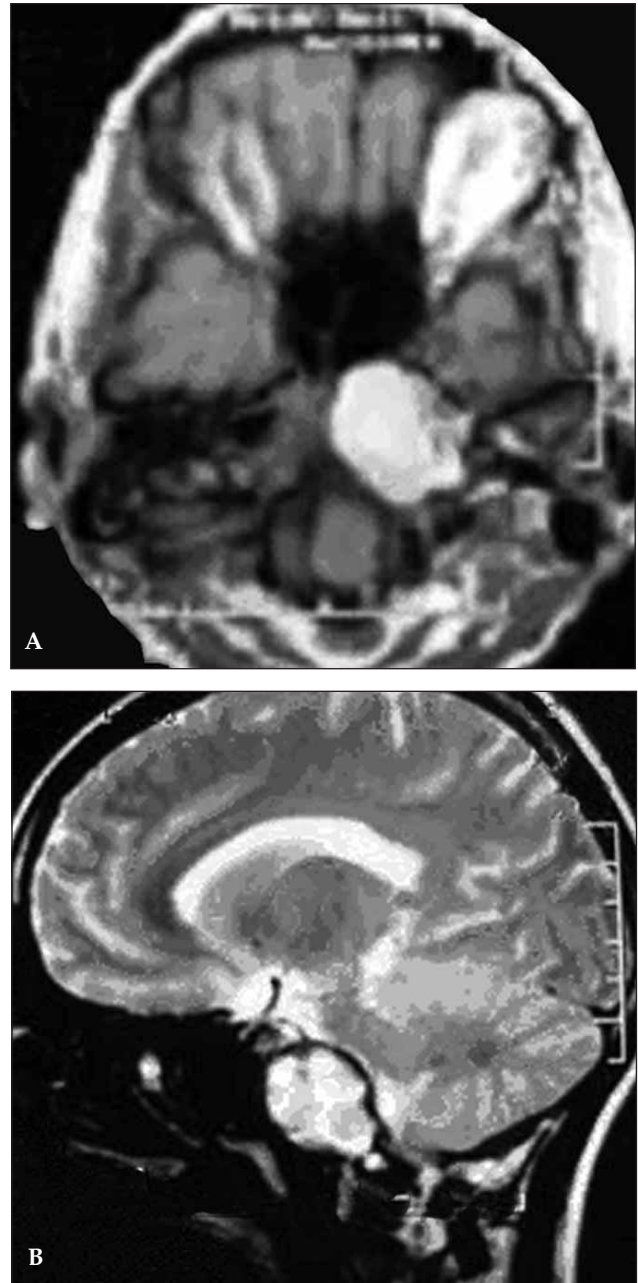


Figure 1. Axial T1-(left) (A) and sagittal T2-(right)(B) weighted magnetic resonance images showing the cholesterol granuloma involving the right petrous apex posterior to the sphenoid sinus and adjacent to the carotid artery.

disruption of vital structures is demonstrated by the arrow in (Figure 3).

INTERVENTION

Endoscopic drainage and resection of the cyst wall of the cholesterol granuloma was performed through the left nostril. With the assistance of the endoscope, the sphenoid septum was grabbed after



Figure 2. Axial bone window CT scan image showing an expansile mass (star) of the left petrous apex with bone remodeling of the clivus and skull base.

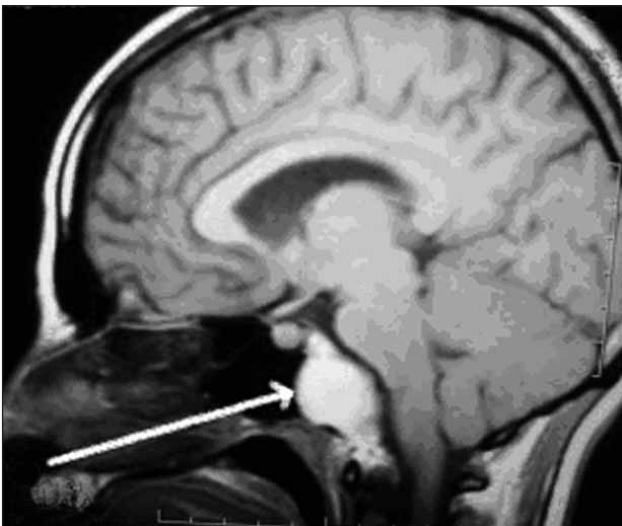


Figure 3. Sagittal T1-weighted magnetic resonance image of the left petrous apex granuloma obtained in 2004. The arrow illustrates the surgical approach for drainage.

removal of the sphenoid mucosa on the rostrum at the level of the sphenoid sinus ostium without scarifying sphenoid sinus ostium. With straight and angled endoscopes golden-brown fluid (Figure 4) and debris were removed, and the cyst was opened, drained, and widely marsupialized. Exposed dura remained intact. A silicone tube drain was placed in opening window for three weeks (Figure 5). Total operative time was under 1 hour, and the patient tolerated the procedure well.



Figure 4. Golden-brown fluid drained from the cyst during surgery.

Histopathologic examination revealed a granulomatous inflammatory lesion containing cholesterol clefts, macrophages, foreign body type giant cells and hemosiderin. Embedded within the granulomatous response were foci of tiny cystlike structures lined by nonciliated flattened cuboidal epithelium, consistent with the diagnosis of CG (Figure 6).

The postoperative course of patient was uncomplicated and she was discharged from the hospital on 3rd postoperative day. Her headache and diplopia resolved within 2 days after the surgery. She remained asymptomatic four years after surgery. Follow-up MRI scan confirmed drainage of lesion without any mass effect (Figure 5). Outpatient endoscopy confirmed patent cyst fenestration..

DISCUSSION

CGs were initially described in the peritoneum in 1893 (13) and have subsequently been reported in numerous other locations, including the pneumatic pathways of the temporal bone (5,11). CGs of the petrous apex are uncommon because the petrous apex is pneumatized in only 30% of temporal bones (17), with an incidence of less than 0.6 cases per million population per year (9).

Petrous apex CGs tend to remain clinically silent, but as the lesion expand, headaches and cranial neuropathies may arise, impairing hearing, balance, speech, and swallowing (4). Contralateral involvement of cranial nerves, as in our patient, has been seen in petrosal mass lesions like tumors and cause false localizing by clinical estimation. The nature of the lesion, the presence of brain stem

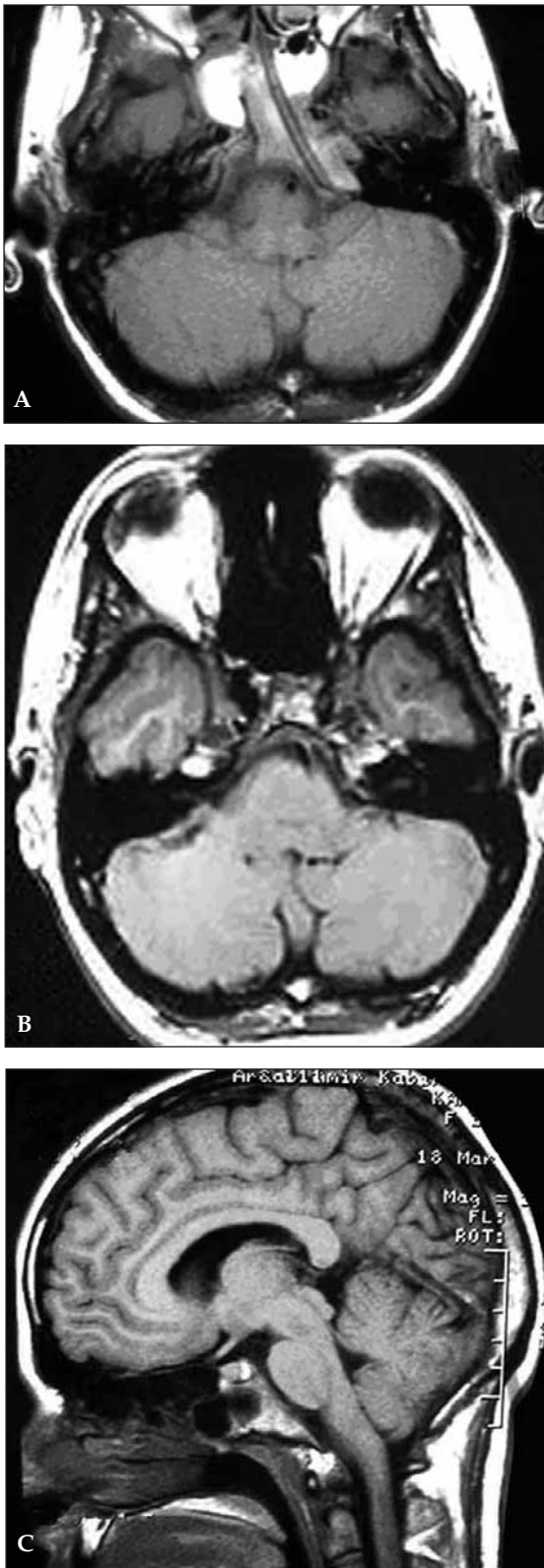


Figure 5. T1-weighted magnetic resonance imaging scans obtained on the second postoperative day (left) (A), 2006 (middle) (B) and 2008 (right) (C) showing resolution of the lesion and good communication between the residual cavity and the sphenoid sinus.

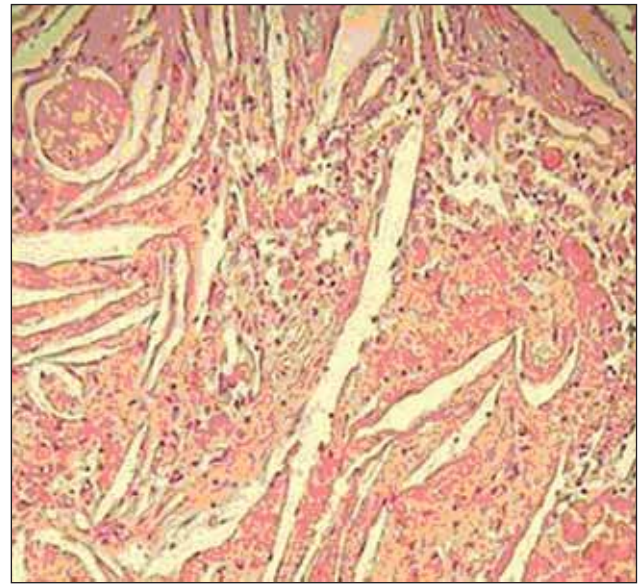


Figure 6. Photomicrograph of tissue removed during surgery in 2004 showing inflammatory granulation and fibrous tissue containing numerous elongated slit-like cholesterol clefts surrounded by foreign-body type giant cells as well as foamy and hemosiderin-laden macrophages.

distortion, the anatomic variation of posterior fossa, and the relationships of cranial nerves and nearby blood vessels, are factors influencing the occurrence of false localizing (10). This presentation, as we know, is not reported in CG of the petrous apex yet.

The treatment for symptomatic petrous apex CGs is surgical drainage and permanent aeration to prevent recurrence. Due to lack of a true epithelial lining, total surgical excision is not essential. Numerous surgical approaches (i.e. translabyrinthine, infracochlear, infralabyrinthine, Supralabyrinthine, and transsphenoidal) to petrous apex CGs have been described. Determination of the appropriate approach depends on the patient’s hearing status as well as the location of the lesion relative to adjacent neurovascular structures (1).

Hearing patients with lesions abutting the posterior wall of the sphenoid sinus can undergo drainage through the transsphenoidal approach (15). Contemporary advances in endoscopic sinus surgery (7,12,14, 18) allowed us to incorporate these new techniques that led to the successful endoscopic, external transtympanic transsphenoidal approach to cystic lesions of the petrous drainage of a CG. The technique, when compared to an intracranial procedure, is far less invasive. The addition of the endoscopic visualization technology to traditional

microsurgical approaches lowers the risk of cerebrospinal fluid leak due to perforation of the dura, and allows the rapid identification of important structures lying behind an otherwise nondescript posterior sphenoid sinus wall. In addition, the cyst can be widely opened (2,8,19). Moreover, the transsphenoidal approach can be safely performed in individuals with a high jugular bulb (its damage is a concern with the subcochlear approach) (6), and when there is any risk of damage to the inner ear and facial nerve. Decreased invasiveness was of crucial importance to our patient, whose young age in part amplified the fears associated with an intracranial procedure. We used transrostral transsphenoid surgery in our patient to lessen the possibility of damage to sphenoid sinus ostium while preserving the sphenoid sinus function.

Traditional surgical treatments of cholesterol granulomas have the shortcoming of producing a relatively narrow isthmus through which permanent drainage must occur and are accompanied with high rates of restenosis with cyst reaccumulation (1). Our patient remained asymptomatic four years after surgery and follow-up studies confirmed patent cyst fenestration.

Several of the cholesterol granulomas were multiloculated and endoscopic examination allowed removal of septae between separate fluid accumulations, resulting in a more complete drainage of the cysts that would not have been identified with the operating microscope alone (12).

Long-standing cholesterol granulomas frequently contain hemosiderin sediment and concretions that may be difficult to clean and evacuate through the relatively small opening obtained. Endoscopic visualization allows more complete removal of this debris and, reduces the osmotic effect, leading to the accumulation of more debris (12). The transsphenoidal approach also allows for remarkable ease of follow-up when compared to earlier procedures. Follow-up examinations consist of clinic-based endoscopic view of the sphenoidotomy and cyst cavity. If necessary, cleaning of the cyst cavity may also be performed at the time of follow-up.

Contralateral involvement of cranial nerves may be seen in the petrous apex CG. The transrostral transsphenoidal endoscopic drainage of petrous apex CGs, in addition to preservation of sphenoid sinus function, is associated with low risk of facial or

hearing function defect and other possible intracranial complications. Furthermore, this method provides wide access to the cyst, outpatient follow-up in office and if necessary, reopening with little morbidity.

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