



Case Report

Cholesterol Granuloma In The Petrous Apex: A Case Report

Seref DOGAN, Tekin OZCAN, Soner SAHIN

Uludag University, School of Medicine, Neurosurgery, Gorukle/Bursa, Türkiye

Abstract

A-72-year-old man admitted with the complaint of mild right facial numbness and headache. His neurological examination revealed facial paresthesia on the right over the distribution of second division of the trigeminal nerve. Computed tomographic and magnetic resonance imaging showed an expansive lesion in the right petrous apex. The patient underwent surgery via right suboccipital retrosigmoid approach and the tumor was totally removed. Microscopic examination revealed a cholesterol granuloma. The suboccipital approach can be safely used in cases which have lesions invading posterior fossa and causing the clinical picture.

Keywords: Cholesterol granuloma, petrous apex, suboccipital approach, cerebellopontine angle

Petroz Apeks İçerisinde Kolesterol Granulomu: Olgu Sunumu

Özet

72 yaşında erkek hasta sağ yüz yarısında hafif uyuşukluk ve baş ağrısı nedeniyle yatırıldı. Nörolojik muayenesinde trigeminal sinirin ikinci dalının dağılımına uyan bölgede sağda fasiyal parestezi mevcuttu. Bilgisayarlı tomografi ve Manyetik rezonans görüntüleme sağ petroz apekte kitle lezyonu saptandı. Hasta sağ suboksipital retrosigmoid girişimle operasyona alındı ve tümör total olarak çıkarıldı. Patolojisi kolesterol granulomu olarak değerlendirildi. Posterior fossayı invaze eden lezyonlarda ve klinik bulguları ortaya çıkan hastalarda suboksipital yaklaşım güvenle kullanılabilir.

Anahtar Kelimeler: Kolesterol granulomu, petroz apeks, suboksipital girişim, serebellopontin açığı

INTRODUCTION

Cholesterol granuloma is an unusual clinical entity which has been described as an inflammatory granulation appearing in response to the deposits of cholesterol crystals^(14,20). It can develop in any portion of air cells within the temporal bone as a result of a lack of aeration and inadequate drainage. It has a predilection to occur especially in the middle ear cavity

followed by the mastoid process and the petrous apex⁽¹⁵⁾. Cholesterol granulomas arising within the petrous apex are therefore uncommon. However, cholesterol granulomas were found to be 10 times more common than cholesteatomas and 40 times more common than petrous apex mucocoeles⁽²⁾. We present a large cholesterol granuloma involving the petrous apex. We discuss its clinical

presentation, radiological evaluation and surgical management.

CASE PRESENTATION

A 72-year-old man was admitted to the hospital with mild right-sided facial numbness and headache. The results of the physical examination were normal. Neurological examination was normal except his right facial paresthesia in the second division of the trigeminal nerve. On magnetic resonance imaging (MRI) the lesion had a homogeneously well-defined high intensity signal on T1- weighted images (Fig 1a) and a hypointensity signal on T2-weighted images (Fig 1b). But the lesion was not enhanced after gadolinium administration. The lesion was also compressing to the V., VII. and VIII.

cranial nerves. High resolution computed tomography (HRCT) revealed an expanding mass that enlarged and destructed of the right petrous apex (Fig 2). The brainstem auditory evoked potentials showed prolonged latencies of waves I, II, III and V on the right with 100 dB. Surgery was performed via right suboccipital retrosigmoid approach in the lateral bench position. The tumor was expanding to the cerebellum and brainstem, and was totally removed by curetting the epithelial wall. Histological findings revealed cholesterol granuloma, characterized by foreign-body giant cells and surrounded by hemosiderin deposits (Fig. 3). The patient was recurrence-free both clinically and radiologically more than 2 years after surgery (Fig. 4).

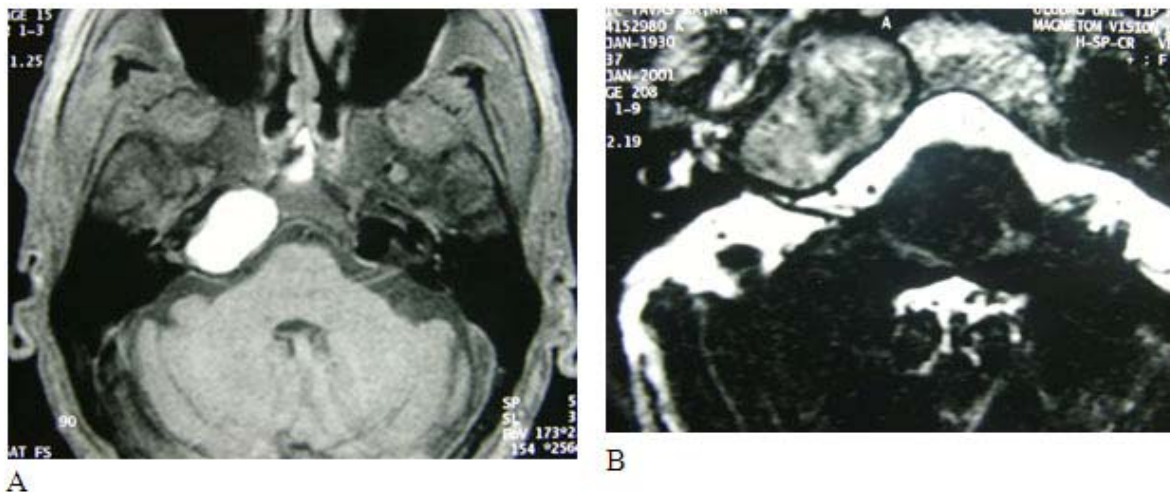


Figure 1: MRI demonstrating abnormal lesion of the right petrous apex. a- The lesion had a homogenous hyperintensity on T1- weighted image b- and heterogenous hypointensity on T2- weighted image. Compressions of cranial nerves V, VII, and VIII were also evident

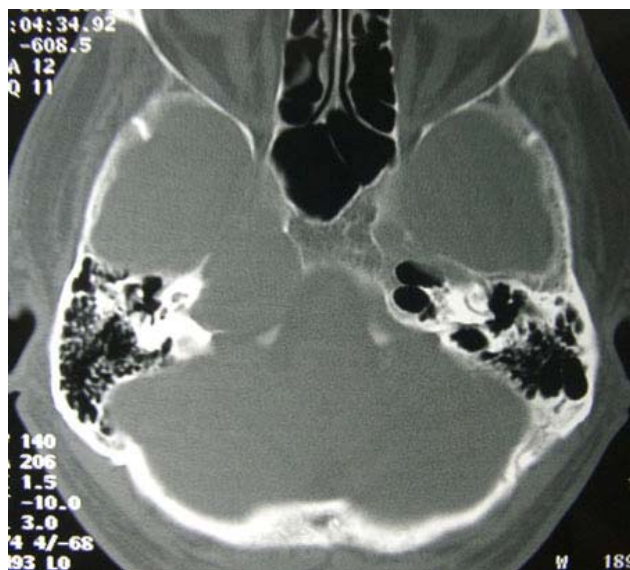


Figure 2: Axial High Resolution CT scan demonstrating an expanding lesion and bony erosion of the right petrous apex

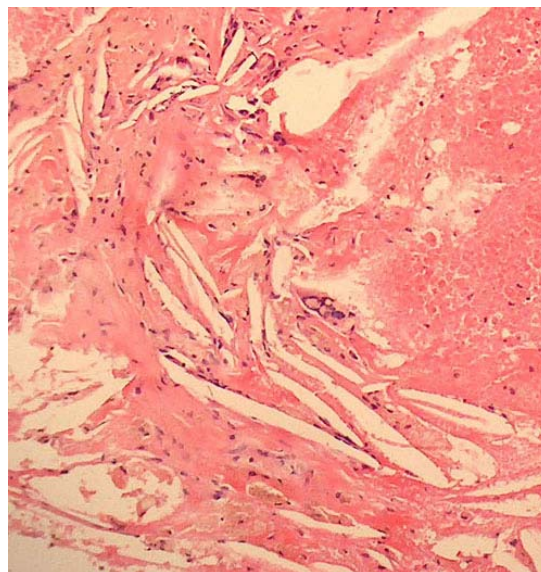


Figure 3: Photomicrograph showing cholesterol clefts surrounded by multinucleated giant cells (HE stain, 100x)



Figure 4: Postoperative MRI scans showing aeration of the tumoral cavity (arrow).

DISCUSSION

Cholesterol granuloma may occur within any area of pneumatized temporal bone and it is associated with a variety of middle ear disorders followed by chronic obstruction of air exchange and inadequate aeration. Subsequently, absorption of gases, hypoxia, or negative pressure may

cause mucosal edema with resultant stagnation and extravasation of blood, which can produce hemosiderin and cholesterol crystals. These substances lead to foreign-body reaction. Thus, cholesterol granuloma develops itself by repeating this process^(17,18).

Patients with petrous apex cholesterol granulomas may present with a variety of complaints, including hearing loss, vertigo, headaches, tinnitus, change in facial sensation, otalgia, diplopia, trigeminal neuralgia, facial spasm, and seizure. Essentially, any focal neurological deficit, especially of cranial nerves V–VIII, should prompt a radiological investigation and raise suspicion for cholesterol granulomas⁽¹⁹⁾.

Distinguishing a cholesterol granuloma from other lesions of petrous apex can be challenging. The differential diagnosis of a petrous apex lesion includes cholesterol granuloma, cholesteatoma, mucocele, epidermoid cyst, chordoma, metastasis, and petrous apicitis⁽¹²⁾. Computed tomography (CT) and MRI are both useful in the diagnosis of petrous apex cholesterol

granulomas. A CT of a cholesterol granuloma is nonenhancing, well marginated, and bone erosion is usually present⁽²¹⁾. The MRI of a cholesterol granuloma is pathognomonic – there is high signal intensity on both T1 and T2-weighted images and there is no gadolinium enhancement, whereas cholesteatomas and epidermoid cysts show slightly greater cerebrospinal fluid signal intensity^(13,17,21).

In the context of treatment of cholesterol granulomas appearing at the petrous apex, some surgical approaches remain controversial and have been debated about the best way to excise the tumor and establish a drainage route into the pneumatized space in the petrous bone⁽⁵⁾. Management of cholesterol granuloma may be medical or surgical depending on its size and the symptoms it causes. Small lesions that haven't produced any symptoms are proposed to be followed clinically and radiologically^(4,5,16). Fenestration or cylistic tubes were the formerly used drainage techniques in the treatment of cholesterol granuloma^(6,8). However, Eisenberg et al. pointed out that neither of these techniques did not provide enough drainage because of the hindrance caused by pathophysiology and the content of the granuloma⁽⁵⁾. Moreover, studies with long-term follow up have reported recurrence rates ranging between 40-60% after drainage procedures through lateral approaches^(1,21).

As a consequence, some authors advocate radical resection of these lesions^(1,5). An aggressive cholesterol granuloma requires a surgical procedure to drain the cyst and to reestablish an adequate aeration of the evacuated cavity. Generally, the surgical route to access the lesion is determined according to the patient's preoperative hearing acuity, tumor size, anatomical relation of the tumor itself and the petrous bone and the location of the jugular bulb⁽⁴⁾. If adequate hearing acuity is to be preserved, a middle fossa,

infralabyrinthine, suboccipital, transsphenoidal, infracochlear approach may be recommended⁽⁹⁾. However, the translabyrinthine approach offers the most direct approach to the petrous apex in deaf patients^(3,4). The transcanalicular infracochlear approach is an efficient route providing drainage of the cyst between the carotid artery, jugular bulb and the round window, near the entrance of the eustachian tube. The major disadvantage of this approach is the narrow field of dissection, which may increase the risk of injury to the basal turn of the cochlea and the carotid artery⁽⁸⁾. Middle cranial fossa approach is recommended for giant cholesterol granulomas extending towards middle fossa^(3,5,11). In turn, in the epidural approach the risk of facial nerve injury due to geniculate ganglion injury increases up to 15%. The intradural approach, however, may cause morbidities resulting from the retraction of the temporal lobe⁽³⁾. The transsphenoidal endoscopic surgery approach can be used for cysts that about or prolapse in to the sphenoid sinus. But recurrent stenosis of the opening is still the major disadvantage of this route⁽¹⁰⁾. The infralabyrinthine and infracochlear approaches are used most commonly in patients with normal hearing^(3,8,16). But the infralabyrinthine approach is not safe for the patients with high jugular bulb⁽¹¹⁾. The infracochlear approach has been reported to have various advantages in patients with normal hearing but it carries a significant morbidity risk so good surgical skill is essential^(3,16).

In the literature, the suboccipital approach is performed in limited cases^(7,21). In our case, via suboccipital approach in the lateral bench position, cerebrospinal fluid was aspirated and then the tumor component extending towards brainstems and the cavitation of the tumor was easily seen in the petrous apex without cerebellar retraction.

The management of cholesterol granuloma is determined according to the position of

the lesion in the temporal bone and the hearing status of the patient. We think that especially in cases extending towards cerebellum and brainstem, lateral bench suboccipital approach provides better view of the tumor and its cavity.

Correspondence to:

Seref Dogan

E-mail: serefdogan01@yahoo.com

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