Microscopic and endoscopic transsphenoidal approach to petrous apex cholesterol granuloma: Case report

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Received 23 September 2012; accepted 5 October 2012
Available online 31 October 2012

KEYWORDS
Petrosal apex; Cholesterol granuloma; Transsphenoidal approach

Abstract  Objective: Transsphenoidal approach through the microscopic and endoscopic technique to drain a petrous apex cholesterol granuloma.
Method: A 52-year-old woman presented with cholesterol granuloma of the right petrous apex complaining of progressive hearing loss and fullness sensation. The lesion was treated via transsphenoidal approach to establish a drainage pathway into the nasopharynx.
Result: The postoperative course of the patient showed improvement of the hearing threshold and disappearance of the drowsiness and aural fullness.
Conclusion: This procedure for the drainage of petrous apex cholesterol granuloma showed to be effective, safe and a minimally invasive method of treatment without postoperative complications.

1. Introduction

Cholesterol granuloma or cholesterol cyst of the petrous apex is an inflammatory reaction with giant cells in response to products of hemoglobin degradation. It can develop in different tissues throughout the body. It appears as an expansible mass that contains brownish-yellow debris with cholesterol crystals and is characterized by slow growth. Clinical symptoms may be hearing loss, vertigo, and headache as well as affections of the V–VIII (th) cranial nerves or seizure. Cholesterol granuloma can be identified by typical radiological findings in CT and MRI. Cholesterol granuloma needs to be resected via an infralabyrinthine, translabyrinthine or transsphenoidal approach with an establishment of a permanent drainage route in the cases of symptomatic clinical presentation.¹

2. Case report

A 52-year-old woman presented with drowsiness and progressive hearing loss and fullness sensation in the right ear for two months. Physical and neurologic examinations were normal. The pure tone audiogram revealed the right sensorineural hearing loss. Her preoperative hearing level was 30 dB. A
computer tomography (CT) scan of the petrous bone and skull base showed an expansile, isodense, non-enhanced mass in the right petrous apex, markedly eroding the surrounding bone with involvement of the anterior wall of the internal auditory meatus (Fig. 1A,B). T1-weighted axial magnetic resonance imaging (MRI) demonstrated a hyperdense mass and isodense mass in T2-weighted MRI involving the right petrous apex posterior to the internal carotid artery (Fig. 2A,B). The lesion was separated from the sphenoid sinus by a thin layer of bone. Cerebral angiography showed nothing remarkable. The preoperative suspicion was cholesterol granuloma of the right petrous apex.

Microscopic and endoscopic drainage and resection of the cyst wall of the cholesterol granuloma was performed through the left nostril. At the beginning of the procedure, a correction of the deviated nasal septum was performed to gain wide access to the sphenoid septum. With the assistance of operative microscope and endoscope, the sphenoid mucosa was removed after opening the sinus. With the help of the drill, the bone in the posterior wall of the sphenoid sinus was thinned and the cyst was opened, drained, and widely marsupialized (Fig. 3). Exposed dura remained intact. No drain was placed in the opening and two silicone sheets were placed to support the nasal septum. The patient tolerated the procedure well and was transferred to the intermediate care unit overnight for observation and transferred to the normal ward in the morning.

Histologic examination revealed a granulomatous inflammatory lesion containing cholesterol clefts, foreign body type giant cells which are consistent with the diagnosis of cholesterol granuloma.

The postoperative course of patient was uncomplicated. Her drowsiness and fullness sensation in the right ear resolved within 2 days after the surgery. The patient was discharged from the hospital on the eight-postoperative-day. Outpatient examination after three weeks showed improvement in the patient’s hearing level with patent drainage in the posterior wall of the sphenoid sinus (Fig. 4).
3. Discussion

Cholesterol granulomas of the petrous apex represent a rare lesion because the petrous apex is pneumatized in only 30% of the temporal bones. The petrous portion of the temporal bone lies in a difficult anatomic position and has relationship to very important vascular and neural structures. In our hospital we routinely use a combination of CT and MRI to investigate intracranial lesions. Both CT and MRT studies are essential to establish when there is opacification of the air cells in the petrous apex under suspicion, as opposed to asymmetric pneumatization. Preoperatively, detailed analysis of CT and MRI scans is essential to define the anatomy of the jugular bulb, sigmoid sinus, bony labyrinth, facial nerve, IAC and posterior wall of the sphenoid sinus. The cholesterol granuloma appears as a well-marginated, isodense lesion in the CT, with no significant contrast enhancement and bone erosion may be present. The images on the MRI, the T1 and T2 images are hyperintense with respect to the brain.

The treatment strategies depend on the location and size of the lesion, and the treatment for cholesterol granuloma of the petrous apex is drainage or complete excision of the capsule or cyst drainage. The surgical approach to the petrous apex will depend on the available air cell pathways leading there, as well as the portion of the apex that is involved. In some temporal bones, access can be gained by a route posterior to the posterior semicircular canal; in others, the best route is infralabyrinthine. In some temporal bones, there is an access via cells extending over the superior semicircular canal and through the "hole in the doughnut", working through the center of the superior semicircular canal. When there is limited or inadequate access via the existing air cells pathways, the middle cranial fossa approach can provide excellent access for removal of the disease. Transsphenoidal approach can be used for the drainage of cholesterol granuloma in hearing patients with a lesion behind the posterior wall of the sphenoid sinus. The approach is less invasive, especially with the addition of the endoscopic technology, which allows the identification of important structures lying behind the sphenoid sinus and lowers the risk of the perforation of the dura and the cerebrospinal fluid leak.

Whereas Cholesterol granuloma requires proper drainage of the cyst, total excision of the cyst wall is not necessary due to the absence of epithelial lining. The long term patency of the drainage route depends on the width of the opening. In our case the opening was about 10 mm in width, and limited by the internal carotid artery. A silicone drain tube can be set along the opening, but in the present case it was avoided because of the risk of the erosion of the internal carotid artery. To avoid the cerebrospinal fluid leakage and meningitis, the procedure should be done extradurally, and special care should be taken not to lacerate the dura.

Acknowledgment

The authors would like to thank Mrs. Eileen Winkels for her effort in refining the manuscript.
References