Bilateral symptomatic petrous apex effusion

Muzeyyen Yildirim · Senem Senturk · Ebru Guzel · Aslan Guzel · Ismail Topcu

Abstract Petrous apex effusions can present with aural fullness, hearing loss and dizziness. Although they can be followed-up when asymptomatic, clinical management of symptomatic patients is controversial. In this study, we present clinical and radiological findings of a 24-year-old patient with bilateral petrous apex effusion. She had been complaining of bilateral aural fullness and dizziness for 2 years. Radiological examinations revealed bilateral petrous apex effusion. After medical treatment, her symptoms gradually disappeared. In all previous published studies, unilateral petrous apex effusions were reported. To our best knowledge, this is the first patient with trapped fluid in bilateral petrous apex.

Keywords Petrous apex · Effusion · Computed tomography · Magnetic resonance imaging

Introduction

Although the petrous apex is a small area in the skull base, it displays myriad anatomic and pathologic variations. Most petrous apex lesions are readily characterized as either surgical lesions; neoplastic, inflammatory complications of air cell disease, or incidental non-operative findings; asymmetric fatty marrow, trapped fluid [1, 2].

Petrous apex effusions can present with symptoms such as aural fullness, hearing loss and dizziness. In all published studies, it was reported that fluid effusions were observed unilaterally, and they can be followed-up without treatment when asymptomatic. In this study, we present clinical and radiological findings of a case with bilateral symptomatic petrous apex effusion. To our best knowledge, this is the first patient with trapped fluid in bilateral petrous apex.

Case report

A 24-year-old female patient was admitted to our hospital with symptoms including bilateral aural fullness and dizziness over a 2-year period. Her neurologic and otolaryngologic examinations were normal. Audiological assessment was also within normal limits. Axial magnetic resonance (MR) images showed intermediate signal intensity on T1-weighted images (Fig. 1a) and very high signal intensity on T2-weighted images (Fig. 1b) in bilateral petrous apex consistent with high protein content fluid. Postcontrast T1-weighted images (Fig. 1c) revealed no enhancement. Since petrous apex effusions were intermediate signal intensity on T1-weighted MR images, computed tomography (CT) was performed for detailed examination of air-cell trabeculae. The absence of expansile changes and the appearance of preserved air-cell trabeculae on CT (Fig. 1d) in conjunction with MR imaging findings confirmed the diagnosis of trapped fluid (effusion) in the petrous apex air cells.

With the diagnosis of bilateral petrous apex effusion, the patient was treated with a 21 days course of amoxicillin clavulanic acid 1000 mg twice daily and anti-inflammatory

M. Yildirim¹ · S. Senturk² · E. Guzel³ · A. Guzel⁴ · I. Topcu¹

¹Department of Otolaryngology,
University of Dicle, Diyarbakir, Turkey

²Department of Radiology,
University of Dicle, Diyarbakir, Turkey

³Department of Radiology,
Veni Vidi Hospital, Diyarbakir, Turkey

⁴Department of Neurosurgery,
University of Dicle, Diyarbakir, Turkey

M. Yildirim (✉)

E-mail: muzeyyenylidrm@hotmail.com

(a)

(b)

(c)

Figs. 1 a, b and c, MR shows low signal intensity on T1-weighted (a) and high signal intensity on T2-weighted (b) images in bilateral petrous apices, consistent with uncomplicated fluid. Post contrast T1-weighted sequence (c) reveals only mild peripheral enhancement

(d)

Fig. 1d CT scan confirms non-expansile fluid attenuation opacification of the pneumatized bilateral petrous apex. The absence of expansile changes and the appearance of preserved air cell trabeculae on CT in conjunction with the low signal intensity on T1-weighted images and high signal on T2-weighted images confirm the presence of trapped fluid in the petrous apex air cells

drugs. The patient's symptoms gradually decreased with the treatment, and disappeared after 2 months. She has no problems on 6 months of follow-up.

Discussion

The petrous apex is anatomically defined as the portion of the temporal bone lying anteromedial to the inner ear, between the sphenoid bone anteriorly and the occipital bone posteriorly, with the extreme apex terminating at the foramen lacerum [3].

Petrous apex effusion is also identified in the literature as “retained” or “trapped” fluid in the petrous apex. The mechanism producing petrous apex effusion presumably depends on air cell tracks allowing spread of infection or inflammation from the middle ear and mastoid to the apex. Entrapment of the fluid in the apex by due to an obstruction of the air cell track pathway results with petrous apex effusion [2, 4]. However, there was no history of otitis media in the anamnesis of the patient we report. On clinical and radiological examination, middle ear and mastoid air cells appeared normal.

The differential diagnosis of petrous apex lesions includes congenital entities (asymmetric fatty marrow, cholesteatoma), infection (apical petrositis), benign obstructive processes (effusion, mucocele, cholesterol granuloma), benign tumor (meningioma, schwannoma), malignant tumor (chordoma, chondrosarcoma, osteosarcoma, plasmacytoma, metastasis), and miscellaneous lesions (histiocytosis X, Paget disease, fibrous dysplasia, petrous carotid artery aneurysm, meningocele/encephalocele) [2]. Despite its unusual nature, Harnsberger points out that retained fluid in the apex is the most common lesion

of the petrous apex. The ratio of petrous apex effusion to cholesterol granuloma of the apex is 500:1. Thus, a thorough understanding of the clinical presentations and possible management alternatives is important [5].

Because the petrous apex is not amenable to direct clinical inspection, imaging studies are a valuable addition to the workup of petrous apex disease. Modern imaging can be credited with an accurate delineation of the differential diagnosis of lesions of the apex [6, 7]. A pneumatized petrous apex is considered to have trapped fluid (effusion) if it shows fluid signal on T2-weighted images and reveals non-expansile, fluid-attenuation opacification of the air cells and preserved air-cell trabeculae on CT scans [2]. The CT scan of the patient we report revealed opacification of air-cell trabeculae without expansion. The intermediate signal intensity on T1-weighted images without evidence of contrast enhancement, and high signal intensity on T2-weighted MR images of bilateral petrous apices were consistent with high protein content fluid. These findings are in concordance with the definition of petrous apex effusion in the literature [2].

In all published studies, unilateral petrous apex effusions have been reported so far. In a study of clinic series consisting of 31 patients, all of whom had unilateral effusion in petrous apex, 13 of them were asymptomatic, and the other patients who had clinical symptoms were treated 20 days with antibiotic and steroid. Surgical drainage was suggested when symptoms of the patients showed no recovery after this treatment [4]. Since the patient we report was symptomatic, she was treated with an antibiotic (1 grams of amoxicillin/clavulanic acid twice a day) and an anti-inflammatory drug (150 mg of diclofenac sodium three times a day) for 21 days. After medical treatment, the symptoms were fully recovered.

In another study comprising 13 patients who had unilateral petrous apex effusions, it was reported that all lesions were radiologically differently from the progressive destructive lesions, and it has been suggested that it was not necessary to make concern. They were defined as incidental, 'do not touch me' or 'leave me alone' lesions [2].

The timing of repeated imaging is empiric. Low T1 signal intensity on MR images without loss of air-cell trabeculation and expansion on CT reveals uncomplicated

petrous apex fluid. It has previously been reported that if there is no symptoms, there is no need for radiological follow-up for effusions with low T1 signal intensity on MR images. However, if the fluid has intermediate or high signal intensity it requires 3 years radiological follow up since they could be the initial manifestation of lesions such as cholesterol granuloma. Therefore, it is recommended that fluid effusions with high signal intensity on T1-weighted MR images should be follow-up by high resolution CT [2]. The fluid trapped in bilateral petrous apex of the patient we report showed intermediate signal intensity on T1-weighted MR images. Therefore, the patient will be followed-up by high-resolution temporal CT. We have observed a clear recovery through our medical treatment. Although in early period, we did not need to control the lesions by radiological examination, temporal CT was planned to be performed 1 year after the initial examination.

If destructive petrous apex lesions can be eliminated radiologically, surgical treatment may not be necessary. Medical treatment is recommended for symptomatic patients. In order to confirm that the lesion is stable, radiological follow-up with CT or magnetic resonance imaging is required for equivocal cases.

References

1. Moore K, Davidson H, Harnsberger H, Shelton C (1999) A practical imaging approach to petrous apex lesions. *Int J Neuroradiol* 5:166–184
2. Moore K, Harnsberger R, Shelton C, Davidson HC (1998) "Leave me alone" lesions of the petrous apex. *Am J Neuroradiol* 19:733–738
3. Larson T (1993) Petrous apex and cavernous sinus: anatomy and pathology. *Semin Ultrasound CT MR* 14:232–246
4. Arriaga MA (2006) Petrous apex effusion: A clinical disorder. *Laryngoscope* 116:1349–1356
5. Harnsberger HR (2004) Trapped fluid, petrous apex. in Harnsberger HR, Wiggins RH, Hudgins PA, et al, (Eds.). *Diagnostic imaging: Oxford: Elsevier Head and Neck* 162–165
6. Arriaga MA, Brackmann DE (1991) Differential diagnosis of primary petrous apex lesions. *Am J Otol* 12:470–474
7. Casselman JW (1996) Temporal bone imaging. *Neuroimaging Clin North Am* 6:265–289