

Petrous apex cephalocele accompanied by partial empty sella and oculomotor cistern enlargement

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Section: Neuroradiology

Area of Interest: Neuroradiology brain

Technique: MR

Case Type: Clinical Cases

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Workplace:

Patient: 56 years, female

Clinical History:

A 56-year-old female patient presented to the neurology department complaining about pressure in her head and eyes during the past few days. She had suffered from arterial hypertension for one year and she had undergone gastric bypass surgery for obesity about 10 years before. Physical examination and routine laboratory findings were normal.

Imaging Findings:

Routine brain MRI examination was performed with a multiplane spin echo T1-T2W and fluid attenuated inversion recovery sequences, and additionally diffusion-weighted images (DWI) were obtained. Bilateral thin-walled cystic lesions at petrous apex contiguous to Meckel's cave were demonstrated. Lesion dimensions were 18.3 x 11.4 mm and 18.2 x 10 mm at the right and left sides, respectively. The lesions had similar signal intensity to cerebrospinal fluid (CSF) on MRI (low T1 and high T2 signal) and CSF-like contents on DWI and apparent diffusion coefficient map (Fig. 1). The appearance is typical for petrous apex cephalocele (PAC) which is explained as herniation from the posterolateral part of Meckel's cave into petrous apex [1]. Also, partial empty sella and bilateral oculomotor cistern (OMC) enlargement were detected accompanying the petrous apex lesions (Fig. 2).

Discussion:

Petrous apex (PA) lesions are rare abnormalities. These abnormalities vary between pathologic to asymptomatic incidental entities [1]. Different names have been given to the cystic lesions in this region: Meckel's cave arachnoid cyst, PAC, PA arachnoid cyst, arachnoid cyst involving the Gasserian ganglion [2]. All these lesions are located in the posterior portion of Meckel's cave and may expand and grow into PA and may erode the bone. PAC is also called 'arachnoid cyst' or 'apical meningocele' [3]. If the surgeon finds dura and arachnoid lining the cyst, it is called 'meningocele' if it only consists of arachnoid the term 'arachnoid cyst' is used [2, 4].

PA cannot be examined directly and PAC is usually asymptomatic, so the majority of the cases are diagnosed incidentally. CSF rhinorrhoea or otorrhoea, trigeminal neuropathy in adults or recurrent meningitis in children may resemble PAC [1, 3, 4]. However, PAC can be seen bilaterally, mostly it is seen unilaterally [5].

The aetiology and pathogenesis of PAC is unclear, but different hypotheses are used to explain congenital and acquired forms. One of the theories for acquired lesions is that increased intracranial pressure and chronic CSF pulsations against the thin anterior wall of a pneumatized PA may result in dehiscence [3, 5]. As reported before, empty sella [2, 6], OMC and Dorello canal enlargements [7] can be seen in addition to PAC. In our case, partial empty sella and OMC enlargements were accompanied by PAC. We think that this coexistence is based on a common pathogenesis resulting in dural enlargements so we agree with the above theory.

The differential diagnosis of the cystic lesions at PA consist of; congenital or acquired cholesteatoma in PA, trapped fluid in PA, apical petrositis, cholesterol granuloma and mucocele [1, 2, 4]. An exact diagnosis is necessary for planning a proper operation or follow-up. PAC has a typical location and sharply defined osseous margins, thin walls, homogeneous content with similar signal intensity as CSF on MR sequences and is hypodense at CT images. If needed, CE MRI, diffusion-weighted MRI and CT studies can be performed. Cholesterol granulomas have high signal intensity on T1W and T2W images, cholesteatomas have restricted diffusion at DWI, mucoceles have high T2 signal but variable (low to intermediate) T1 signal depending on its content and have no connection with Meckel's cave [1, 2, 3, 5]. So, most of the pathologies can be differentiated with imaging studies, but as defined previously arachnoid cyst and meningocele can be identified at surgery. Because of the characteristic findings of the bilateral PAC, partial empty sella and OMC enlargements in our patient there was no need for additional CE MRI or CT examinations. Surgery was not recommended because there was no relationship between our patient's complaints and the radiological findings.

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Petrous apex cephalocele, partial empty sella, oculomotor cistern enlargement coexistence, Congenital or acquired cholesteatoma in petrous apex, Trapped fluid in petrous apex, Apical petrositis, Cholesterol granuloma, at petrous apex, Petrous apex mucocele

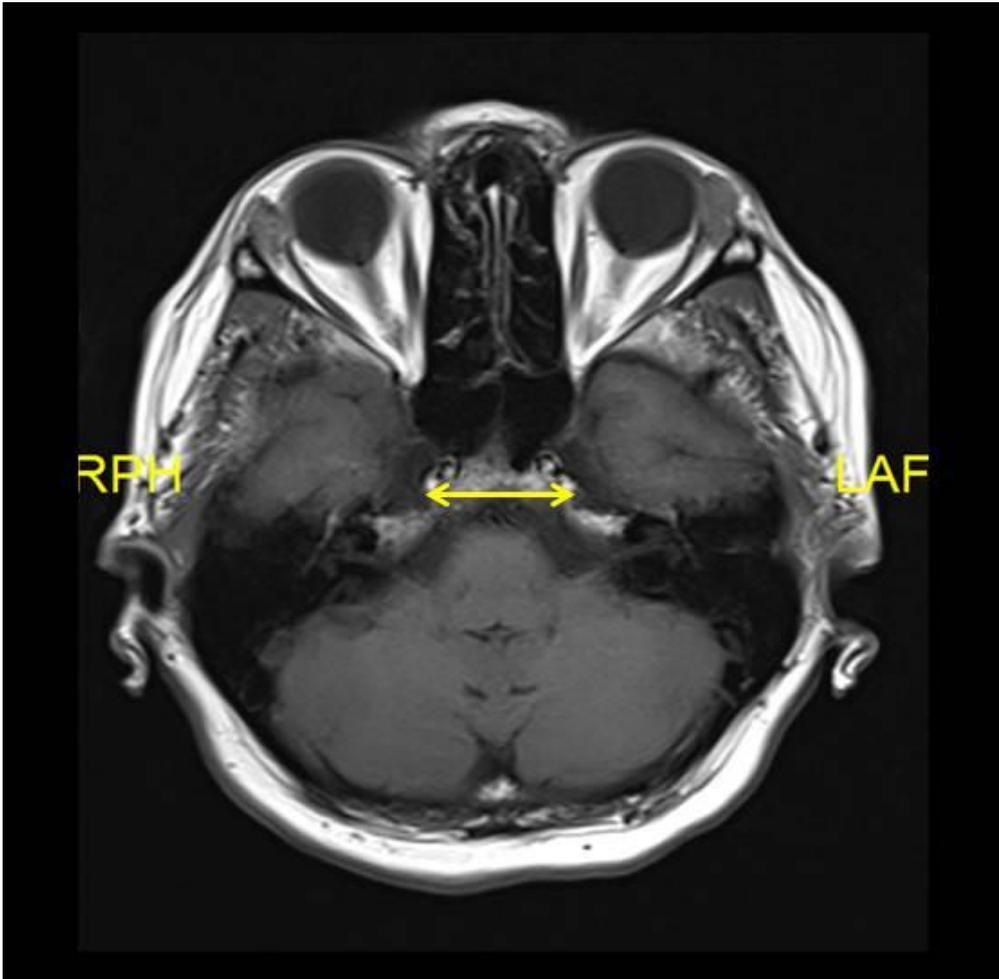
Final Diagnosis: Petrous apex cephalocele, partial empty sella, oculomotor cistern enlargement coexistence

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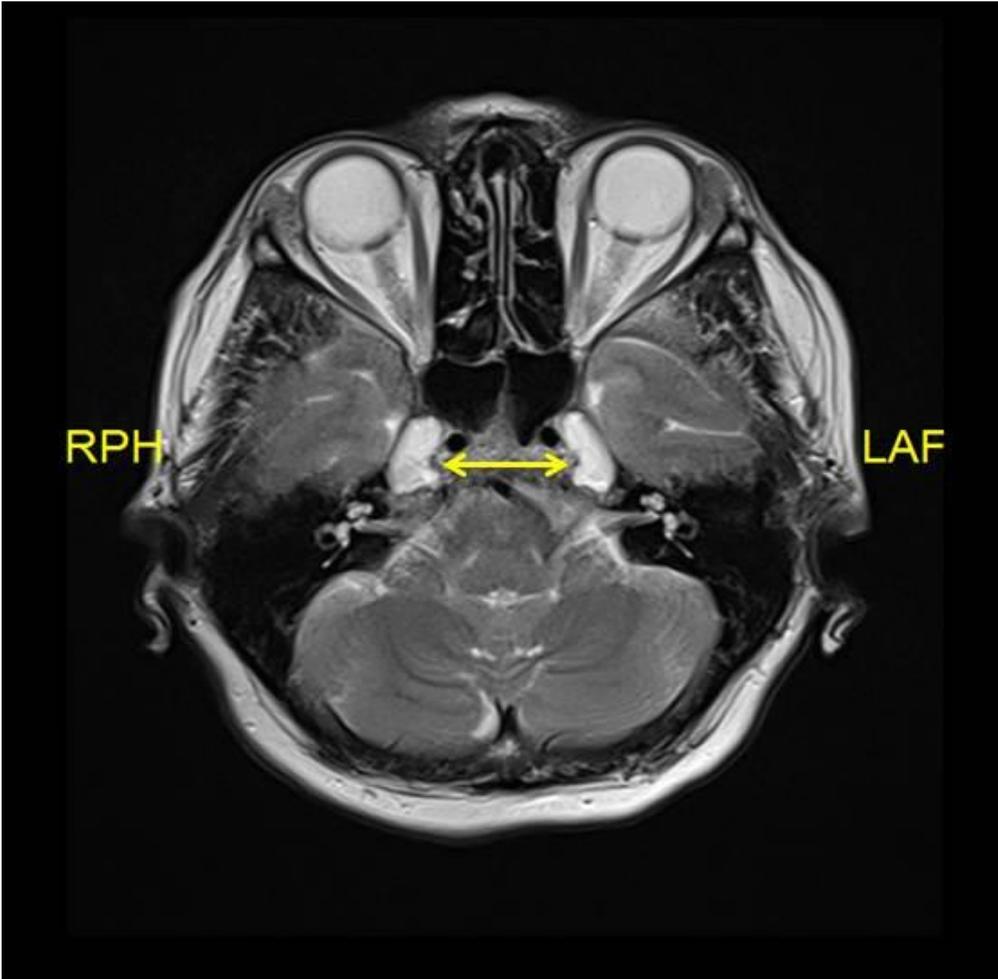
Figure 1

a



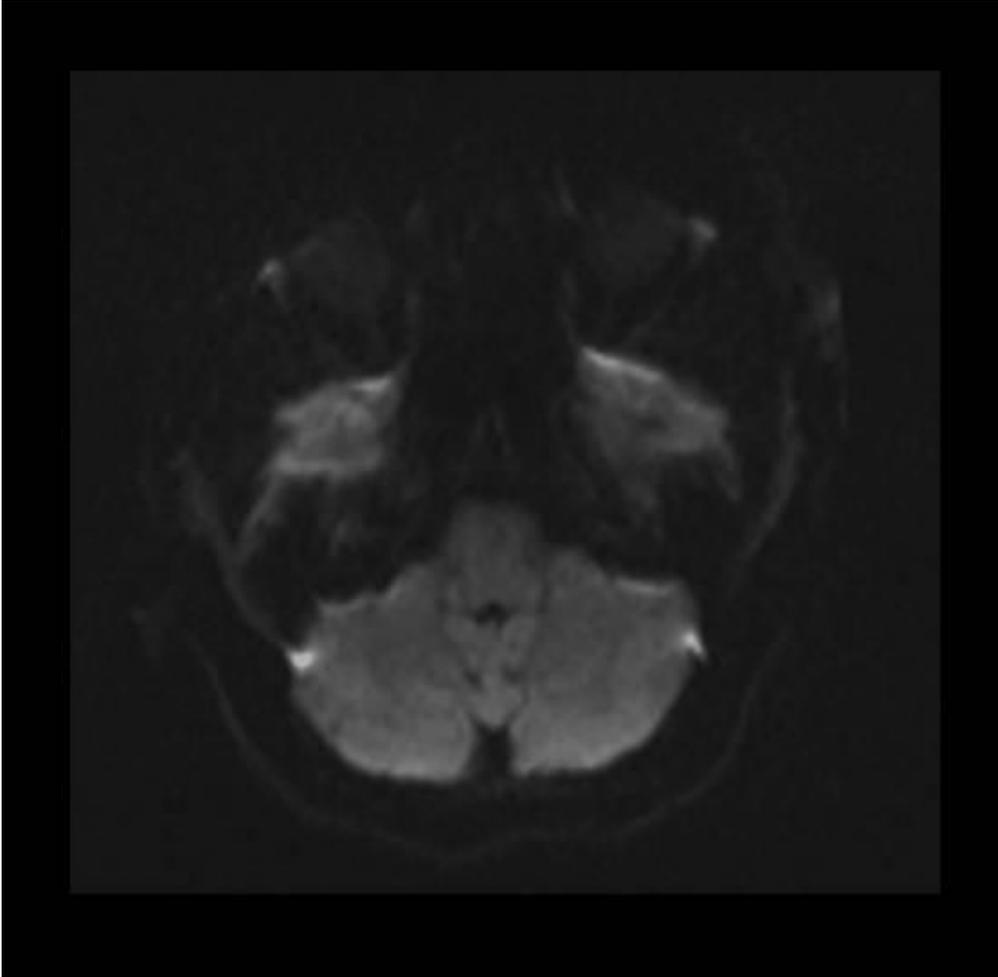
Description: Axial plane T1W image (a) and T2W image (b), shows the cerebrospinal fluid signal intensity cystic lesion arising from Meckel's cave and extending to the petrous apex, typical for petrous apex cephalocele (arrows), DWI (c) and Apparent diffusion coefficient map (d) shows cerebrospinal fluid-like characteristics and diffusion coefficient values **Origin:** Department of Radiology (MRI unit-Siemens Essenza), Memorial Kayseri Hospital, Turkey 2019

b



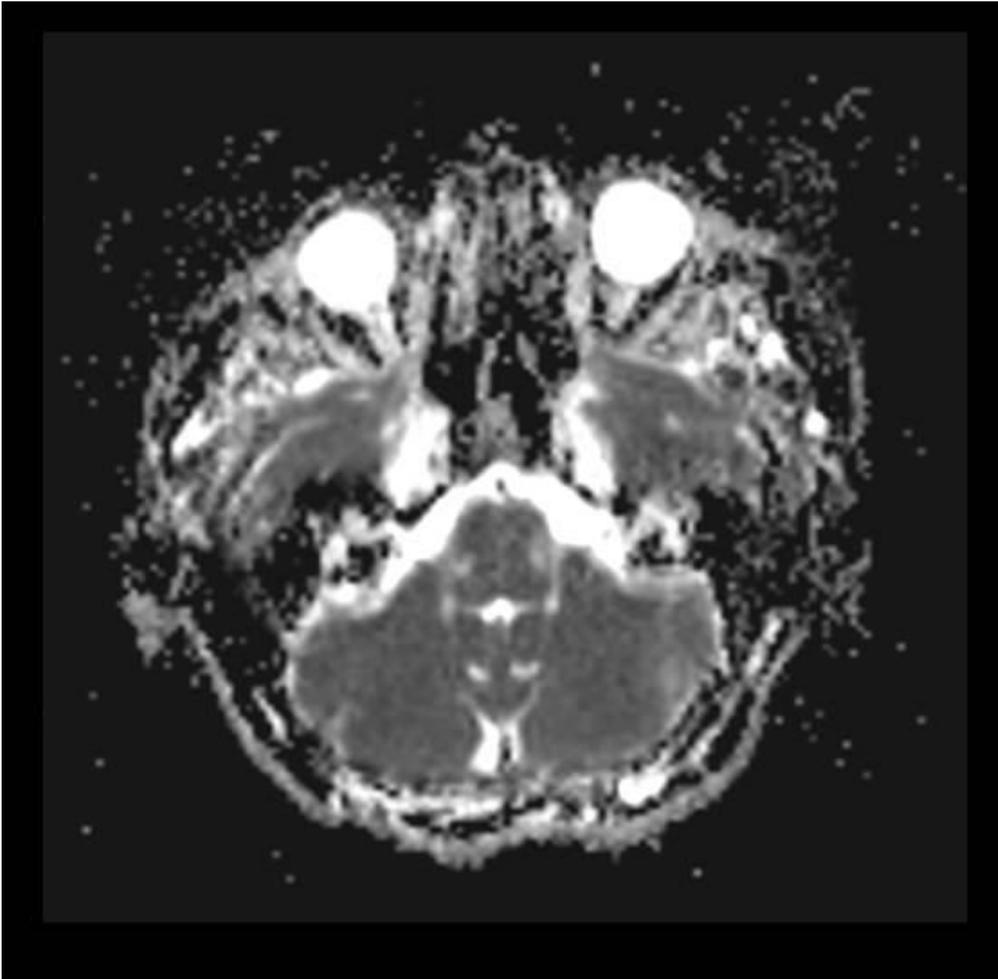
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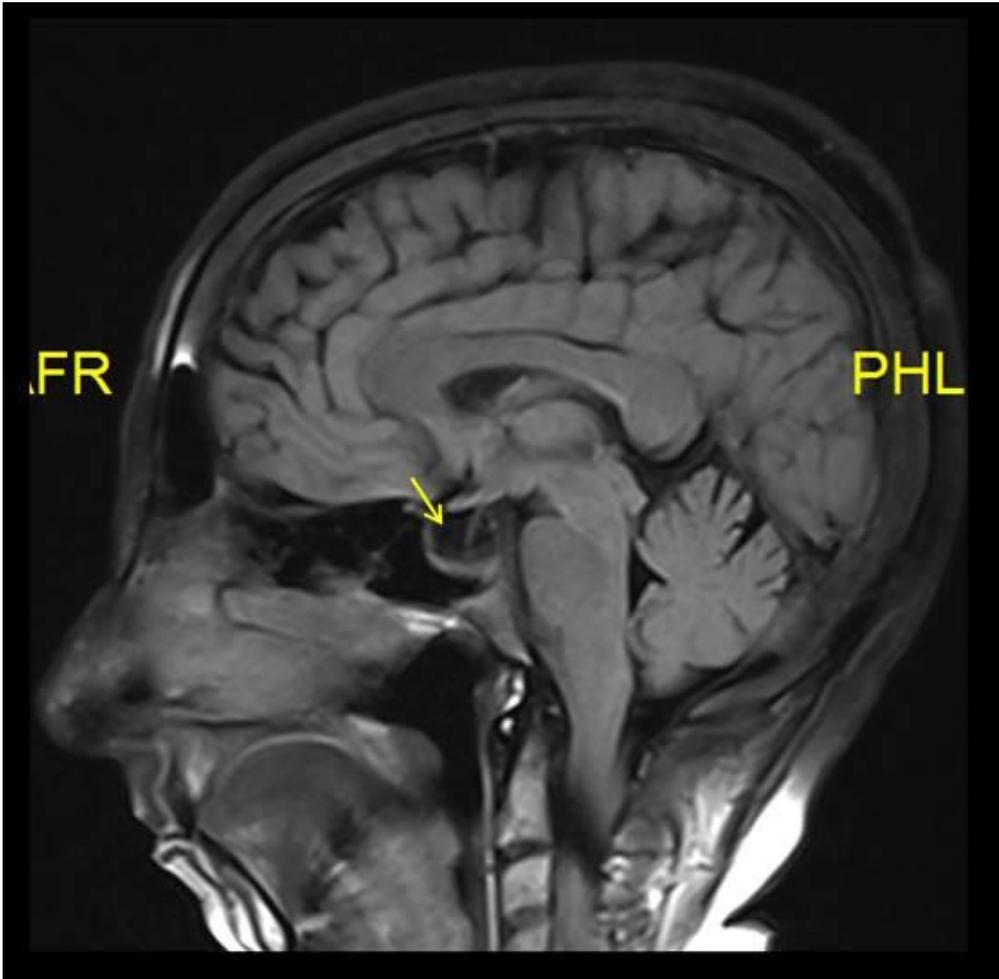
d



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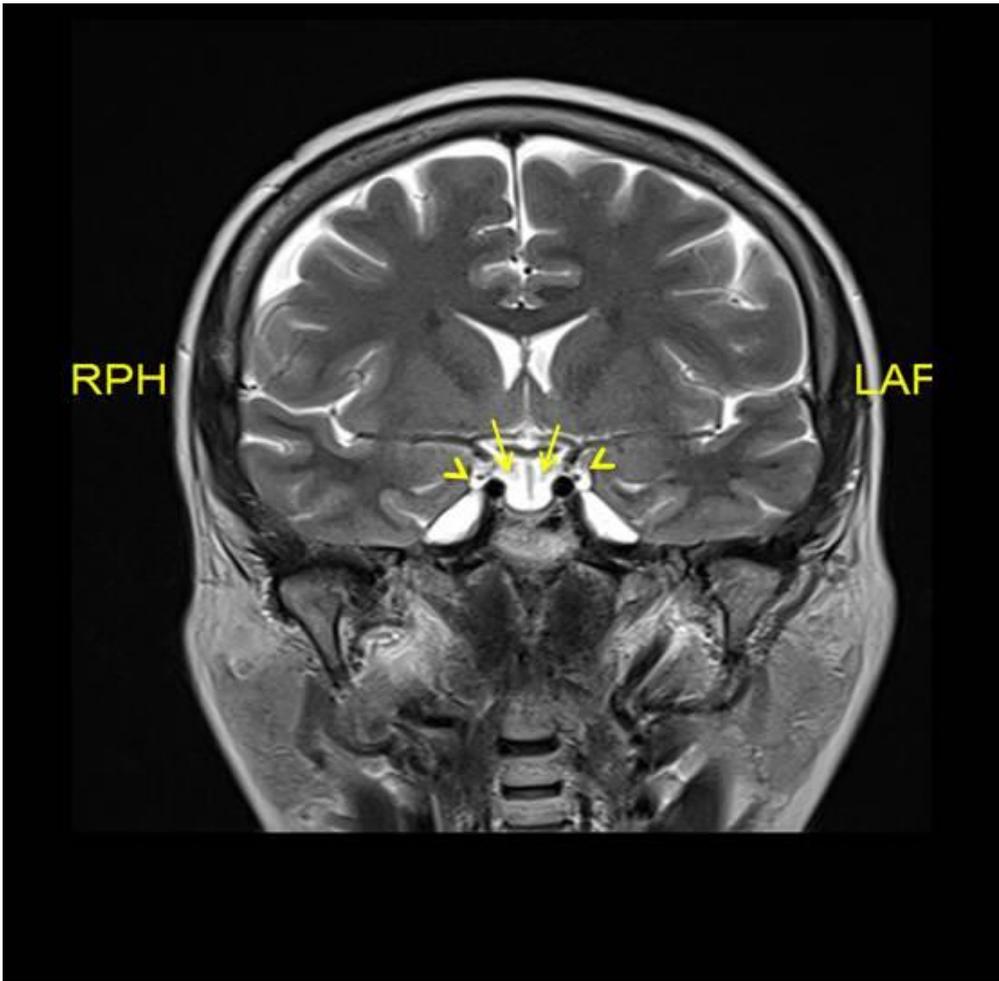
Figure 2

a



Description: Sagittal plane T1W image (a) and Coronal plane T2W image (b), shows the coexistent lesions with petrous apex cephalocele, the partial empty sella (arrows) and bilateral oculomotor cistern enlargement (arrowheads). **Origin:** Department of Radiology (MRI unit-Siemens Essenza), Memorial Kayseri Hospital, Turkey 2019

b



Description: Sagittal plane T1W image (a) and Coronal plane T2W image (b), shows the coexistent lesions with petrous apex cephalocele, the partial empty sella (arrows) and bilateral oculomotor cistern enlargement (arrowheads). **Origin:** Department of Radiology (MRI unit-Siemens Essenza), Memorial Kayseri Hospital, Turkey 2019