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Case Report

Cerebellopontine angle epidermoid cyst masquerading as trigeminal neuralgia: A rare presentation and surgical outcome ☆

Paritosh Bhangale, MBBS[a,*], *Shivali Kashikar, MD*[a], *Pratapsingh Hanuman Parihar, MD*[a], *Ravishankar Patil, MD*[a], *Sakshi Dudhe, MBBS*[a], *Anjali Kumari, MBBS*[a], *Dhananjay Shinde, MBBS*[a], *Rishitha Kotla, MBBS*[b]

[a] *Department of Radiodiagnosis, Datta Meghe Institute of Medical Sciences, Wardha, Maharashtra, India 442001*
[b] *Department of Psychiatry, Datta Meghe Institute of Medical Sciences, Wardha, Maharashtra, India 442001*

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ABSTRACT

Cerebellopontine (CP) angle epidermoid cysts are rare, benign, slow-growing intracranial lesions that arise from ectodermal inclusions during embryogenesis. They often present with symptoms caused by compression of adjacent structures, with trigeminal neuralgia being an uncommon presentation. A 19-year-old female presented with a 1-month history of tingling sensation on the right side of her face. MRI of the brain revealed an extra-axial cystic lesion at the right CP angle extending into the ambient cistern. The lesion appeared hypointense on T1-weighted imaging, hyperintense on T2-weighted imaging, and dirty hyperintense on FLAIR, with diffusion restriction on DWI and no blooming on SWI. It caused a mass effect with compression of the right pons and trigeminal nerve. The patient underwent microsurgical resection of the cyst, and histopathological findings confirmed the diagnosis of an epidermoid cyst. Postoperatively, the patient showed symptomatic improvement and was advised long-term follow-up. This case emphasizes the importance of advanced imaging in diagnosing rare intracranial lesions and highlights surgical resection as an effective treatment for CP angle epidermoid cysts presenting with atypical symptoms.

Background

Cerebellopontine (CP) angle epidermoid cysts are rare, benign lesions that account for approximately 0.2%-1.8% of all intracranial tumors [1]. These lesions originate from ectodermal inclusions during neural tube closure in the third to fifth weeks of embryogenesis, leading to the development of keratinizing squamous epithelium-lined cysts [2]. Although slow-growing, these cysts can eventually exert pressure on adjacent

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* Corresponding author.
E-mail address: paritosh.bhangale@gmail.com (P. Bhangale).

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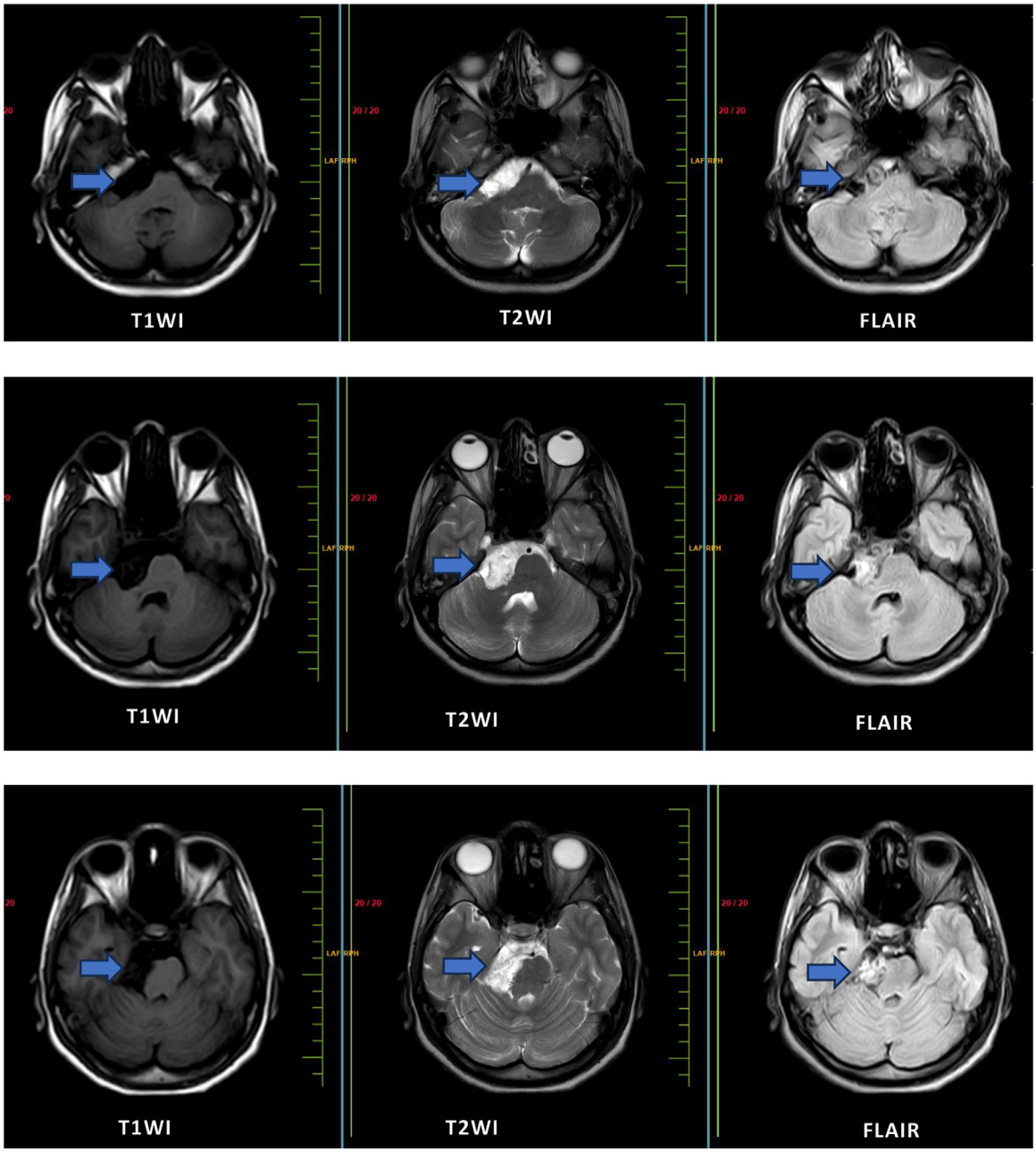

Fig. 1. (A-C) – MRI Brain Axial sections showing cystic lesion in right cerebellopontine (CP) angle cistern appearing hypointense on T1WI, hyperintense on T2WI, showing dirty hyperintensity on FLAIR.

neural structures, causing a wide range of neurological symptoms depending on their size and location [3].

The CP angle is the most common site for epidermoid cysts in the posterior fossa, accounting for 40%-50% of cases. The lesions in this region commonly affect the cranial nerves, particularly the vestibulocochlear nerve (cranial nerve VIII) and the trigeminal nerve (cranial nerve V) [4,5]. Symptoms often include hearing loss, vertigo, and tinnitus due to vestibulocochlear nerve compression, while trigeminal nerve involvement can manifest as trigeminal neuralgia, characterized by facial pain or sensory disturbances [6]. While trigeminal neuralgia is more commonly associated with vascular compression, rare cases caused by tumors such as epidermoid cysts highlight the need for comprehensive imaging and evaluation [7].

Advanced imaging modalities, particularly magnetic resonance imaging (MRI), play a crucial role in diagnosing epidermoid cysts. On MRI, these lesions typically appear hypointense on T1-weighted images and hyperintense on T2-weighted images, with a dirty hyperintense signal on fluid-attenuated inversion recovery (FLAIR) sequences due to keratin and cholesterol content [8]. Diffusion-weighted imaging (DWI) is particularly valuable, as it demonstrates diffusion restriction within the lesion, distinguishing epider-

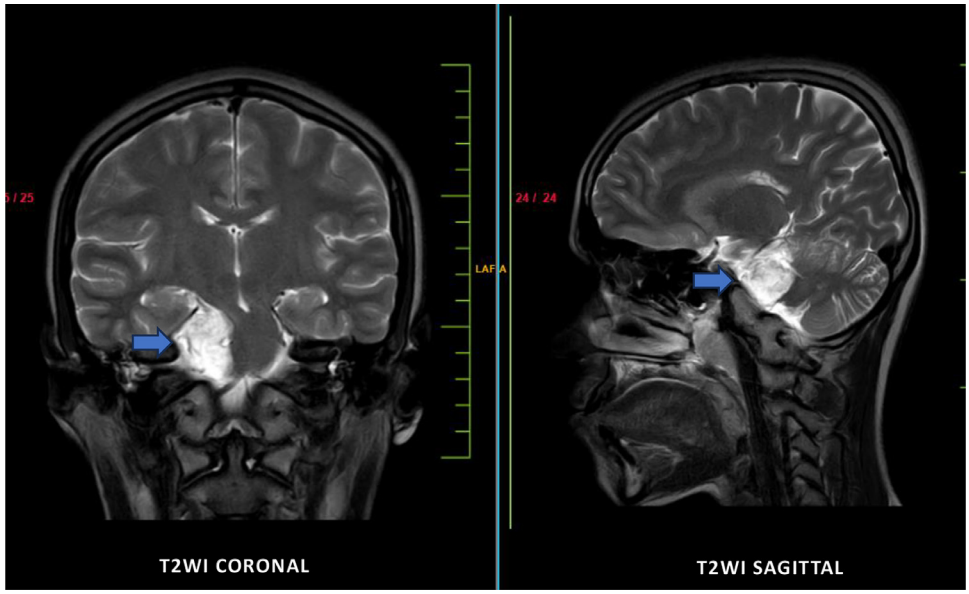

Fig. 2 – MRI Brain Coronal and Sagittal T2WI showing hyperintense lesion in the right cerebellopontine (CP) angle cistern.

moid cysts from arachnoid cysts or other cystic lesions [9,10]. Susceptibility-weighted imaging (SWI) is also used to evaluate calcifications or hemorrhage, which are typically absent in epidermoid cysts [11].

Surgical resection remains the definitive treatment for CP angle epidermoid cysts. The primary goal of surgery is to decompress affected cranial nerves and prevent recurrence by achieving total cyst removal, including the capsule [12]. However, complete excision can be challenging due to the cyst's adherence to critical neurovascular structures, posing a risk of cranial nerve injury or other complications [13]. Despite these challenges, surgical outcomes are generally favorable, and recurrence rates are low when the capsule is completely removed [14].

This case report details a rare presentation of a CP angle epidermoid cyst manifesting as trigeminal neuralgia, underscoring the importance of advanced imaging for diagnosis and surgical intervention for symptom resolution.

Case presentation

A 19-year-old female presented to the emergency department with a 1-month history of a tingling sensation localized to the right side of her face. The symptom was described as intermittent, with no associated pain. There was no history of facial trauma, vomiting, fever, generalized weakness, difficulty in speaking, or headache. Her past medical and family history was unremarkable. There were no motor deficits, cranial nerve abnormalities, or signs of increased intracranial pressure on neurological examination.

Given the localized nature of her symptoms and the absence of systemic involvement, an intracranial cause was suspected. The patient underwent a brain MRI, which revealed a well-defined extra-axial cystic lesion located at the right cerebellopontine (CP) angle extending into the ambient cistern. On imaging, the lesion appeared hypointense on T1-weighted imaging (T1WI) and hyperintense on T2-weighted imaging (T2WI). At the same time, fluid-attenuated inversion recovery (FLAIR) sequences revealed a dirty hyperintense signal, suggesting the presence of desquamated keratin and cholesterol (Fig. 1). Diffusion-weighted imaging (DWI) demonstrated significant restriction within the lesion, a hallmark finding of an epidermoid cyst. Additionally, susceptibility-weighted imaging (SWI) (Fig. 2) showed no evidence of blooming, ruling out hemorrhage or calcifications (Fig. 4). The lesion caused a significant mass effect, compressing the right side of the pons and displacing the right trigeminal nerve, which correlated with the patient's clinical presentation (Fig. 3).

The imaging findings were strongly indicative of an epidermoid cyst. Due to the lesion's size and associated neurological symptoms, surgical intervention was recommended. The patient underwent microsurgical resection of the lesion at an outside hospital. Intraoperatively, the cyst was identified as a pearly, avascular, white lesion consistent with an epidermoid cyst. Meticulous dissection was performed to avoid damage to adjacent cranial nerves, especially the compressed trigeminal nerve.

Histopathological analysis confirmed the diagnosis of an epidermoid cyst. The microscopic examination revealed a cyst lined by stratified squamous epithelium and filled with keratinous debris, confirming the benign nature of the lesion. Postoperatively, the patient showed gradual improvement in symptoms, and no new neurological deficits were reported during follow-up. Long-term monitoring was recommended due to the possibility of recurrence if any cyst remnants were left behind during surgery.

Discussion

Cerebellopontine (CP) angle epidermoid cysts are rare intracranial lesions, comprising only 0.2%-1.8% of all brain tumors. These cysts arise from ectodermal inclusions during

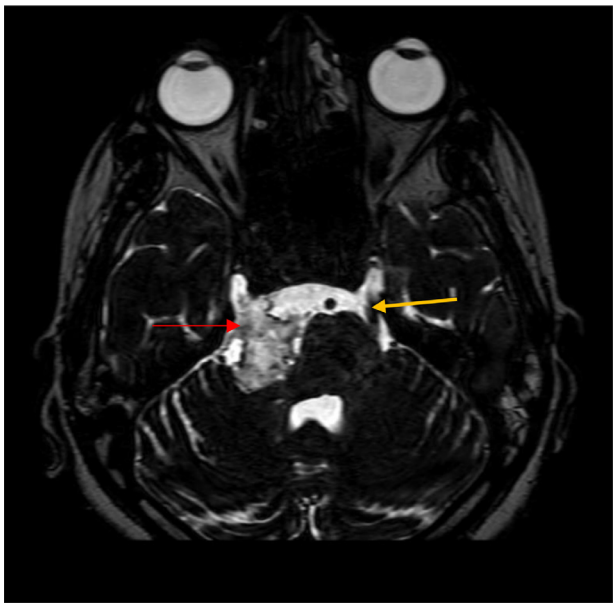

Fig. 3 – MRI Brain Axial T2 DRIVE sequence showing compressed right trigeminal nerve (red thin arrow) by the lesion (as described in the text) and normal left trigeminal nerve (yellow thin arrow).

neural tube closure, resulting in their characteristic stratified squamous epithelial lining and accumulation of keratin and cholesterol debris [15,16]. While CP angle epidermoid cysts can present with a variety of neurological symptoms depending on the structures they compress, trigeminal neuralgia is an uncommon initial manifestation. This case highlights the atypical presentation of a CP angle epidermoid cyst causing isolated trigeminal neuralgia due to direct compression of the trigeminal nerve, a finding also supported by prior studies [17,18].

Magnetic resonance imaging (MRI) is a cornerstone in diagnosing CP angle epidermoid cysts. On T1-weighted imaging, these lesions are hypointense, whereas on T2-weighted imaging, they are hyperintense. The dirty hyperintensity observed on fluid-attenuated inversion recovery (FLAIR) sequences and the diffusion restriction seen on diffusion-weighted imaging (DWI) are considered diagnostic features [8,19]. These findings are consistent with previous reports that describe the utility of FLAIR and DWI in distinguishing epidermoid cysts from arachnoid cysts and other CP angle lesions [20]. The absence of blooming on susceptibility-weighted imaging (SWI) further ruled out hemorrhagic or calcified lesions, narrowing the differential diagnosis [21]. The mass effect identified in this case, including compression of the pons and trigeminal nerve, explains the patient's neurological symptoms and aligns with prior observations of mass-related effects in CP angle epidermoid cysts [22].

Management of CP angle epidermoid cysts typically involves microsurgical resection, aimed at removing the cyst contents and capsule. Complete resection, though desirable, is challenging due to the adherence of the cyst capsule to critical neurovascular structures, increasing the risk of neurological deficits [23,24]. In this case, the patient underwent successful microsurgical resection, with histopathological confirmation of an epidermoid cyst. Histological examination remains the gold standard for diagnosis, revealing cysts lined by stratified squamous epithelium and filled with keratin and cholesterol debris [25]. Despite advances in surgical techniques, complete capsule removal remains controversial, as residual fragments may lead to recurrence, reported in up to 20% of cases [26].

Trigeminal neuralgia caused by CP angle epidermoid cysts is rare and often underrecognized. Studies have shown that up to 5% of cases of secondary trigeminal neuralgia are due to space-occupying lesions such as epidermoid cysts [27]. This reinforces the need for high-resolution MRI in patients with atypical or refractory trigeminal neuralgia, as early identification can prevent delays in diagnosis and management [28]. Advanced imaging techniques, including 3D constructive interference in steady-state (CISS) MRI, have shown promise in identifying nerve compression by CP angle lesions, providing valuable insights for surgical planning [29].

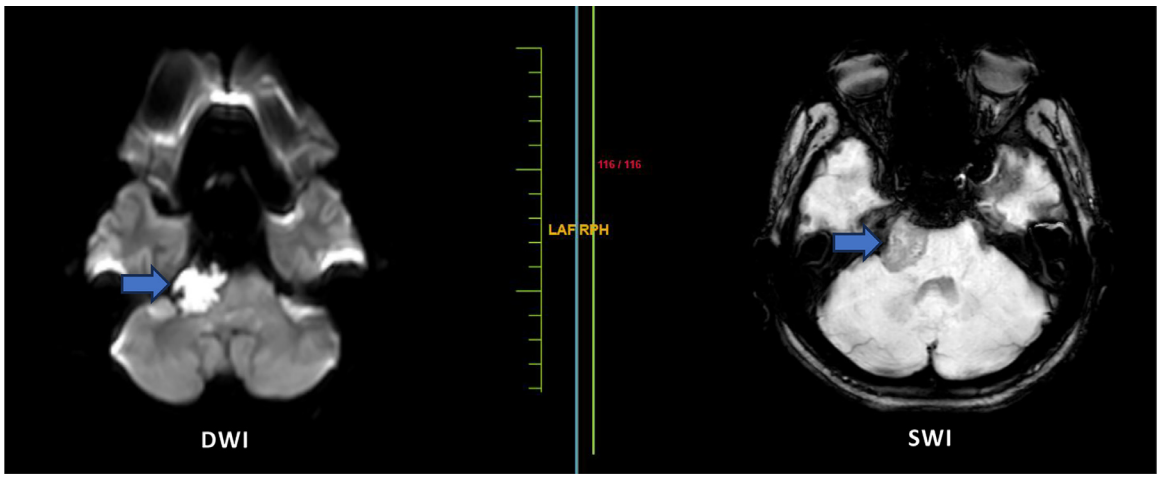

Fig. 4 – MRI Brain Axial sections – Lesion in right cerebellopontine (CP) angle shows restriction on DWI and no blooming on SWI.

The prognosis for CP angle epidermoid cysts is generally favorable with complete surgical resection. However, recurrence remains a concern, particularly in cases with incomplete capsule removal. In addition, complications such as chemical meningitis, a rare but well-documented postoperative issue caused by spillage of cyst contents, must be considered [30]. Long-term follow-up with periodic imaging is recommended to monitor for recurrence and assess residual symptoms [31].

Future directions in the management of CP angle epidermoid cysts include the use of neuronavigation, intraoperative neurophysiological monitoring, and endoscopic-assisted microsurgical techniques to enhance surgical precision and reduce complications [12]. Continued research into minimally invasive approaches and long-term outcomes in patients with CP angle epidermoid cysts will further inform clinical practice and improve patient care.

Conclusion

Cerebellopontine (CP) angle epidermoid cysts, though rare, can present with atypical symptoms such as trigeminal neuralgia, as demonstrated in this case. Advanced imaging modalities, particularly MRI with diffusion-weighted imaging, play a critical role in accurately diagnosing these lesions by distinguishing them from other CP angle masses. Surgical resection remains the cornerstone of treatment, with the primary objective being complete excision to alleviate symptoms and minimize recurrence. However, the proximity of these lesions to critical neurovascular structures necessitates meticulous surgical planning and execution to avoid complications. This case underscores the importance of a multidisciplinary approach involving neurologists, radiologists, and neurosurgeons to optimize outcomes. Long-term follow-up is essential to monitor for potential recurrence and address residual symptoms. Continued advancements in imaging and surgical techniques will further enhance the diagnosis and management of CP angle epidermoid cysts, improving prognosis and quality of life for affected patients.

Patient consent

Written informed consent was obtained from the patient for the publication of this case report.

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