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SPONTANEOUS LOCALIZED RUPTURE OF A MIDLINE PERICALLOSAL DERMOID CYST: A CASE REPORT

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ABSTRACT

Background: Intracranial dermoid cysts are rare midline tumors. While extensive rupture causes global fat dissemination, a localized rupture leads to restricted regional lipid leakage that can be radiologically subtle.

Case Description: A 62-year-old female presented with a progressive fronto-orbital headache and a new-onset focal-to-bilateral tonic-clonic seizure. Brain MRI revealed an elongated midline mass measuring 53 × 17 × 8 mm in the pericallosal region, superior to the corpus callosum. No widespread ventricular or global subarachnoid lipid flooding was found. Instead, multi-sequence MRI demonstrated signs of a localized rupture, evidenced by pathognomonic fat droplets restricted to a few adjacent right frontal cortical sulci. An associated cavum vergae anatomical variant and mild chronic small vessel ischemic changes (Fazekas grade 1) were also noted. The patient underwent a frontal craniotomy via an interhemispheric approach for subtotal tumor resection and targeted subarachnoid irrigation. Postoperative management combined structured oral steroid tapering and therapeutic antiepileptic maintenance.

Conclusion: Localized subarachnoid rupture of a midline pericallosal dermoid cyst can be a diagnostic challenge. Recognizing focal wall disruption and regional sulcal fat droplets on multi-sequence MRI is essential for timely surgical decompression.

Keywords: Intracranial Dermoid Cyst; Pericallosal Tumor; Localized Rupture; Cavum Vergae; Seizure.

1 INTRODUCTION

Intracranial dermoid cysts are rare, benign, congenital midline ectodermal inclusion tumors representing less than 0.5% of primary intracranial neoplasms. They arise from trapped embryonic ectodermal elements during neural tube closure and expand slowly over decades due to the accumulation of hair, sebum, and desquamated squamous epithelium.

While many lesions remain asymptomatic or cause slow mechanical compression, spontaneous cyst rupture is a critical complication. A catastrophic rupture floods the entire cerebrospinal fluid (CSF) network, triggering global chemical

meningitis, hydrocephalus, and cerebral vasospasm. Conversely, a localized rupture is a distinct, contained variant where a minor capsule breach allows a small volume of toxic sebaceous material to leak exclusively into immediate perilesional sulci. Because global fat dissemination is absent, classic meningeal signs are typically negative, and patients instead present with localized headaches or focal seizures due to regional cortical chemical irritation. This case report describes the clinical presentation, multi-sequence MRI features, and microsurgical management of a localized rupture of an elongated midline pericallosal dermoid cyst co-existing with an incidental midline cavum vergae variant.

2 CASE PRESENTATION

A 62-year-old female with a history of hypertension presented following a new-onset focal-to-bilateral generalized tonic-clonic seizure lasting two minutes. Upon post-ictal recovery, she reported a three-month history of a progressive, dull, right-sided fronto-orbital headache. On examination, she was alert and neurologically intact (GCS 15/15) with preserved visual fields and no signs of meningeal irritation.

Brain MRI revealed an elongated, well-delineated midline mass measuring 53 × 17 × 8 mm (AP × T × H) strictly within the pericallosal region, superior to the corpus callosum. The lesion demonstrated classic fat-containing tumor characteristics, showing marked hyperintensity on T1-weighted sequences and heterogeneous mixed signal on T2-weighted images.

There was no widespread floating lipid debris in the lateral ventricles or distant basal cisterns. However, high-resolution multi-sequence MRI confirmed clear signs of a localized rupture into the adjacent subarachnoid spaces, evidenced by a few small, pathognomonic fat droplets trapped within a few right frontal cortical sulci adjacent to the anterior boundary of the tumor (fig 1).

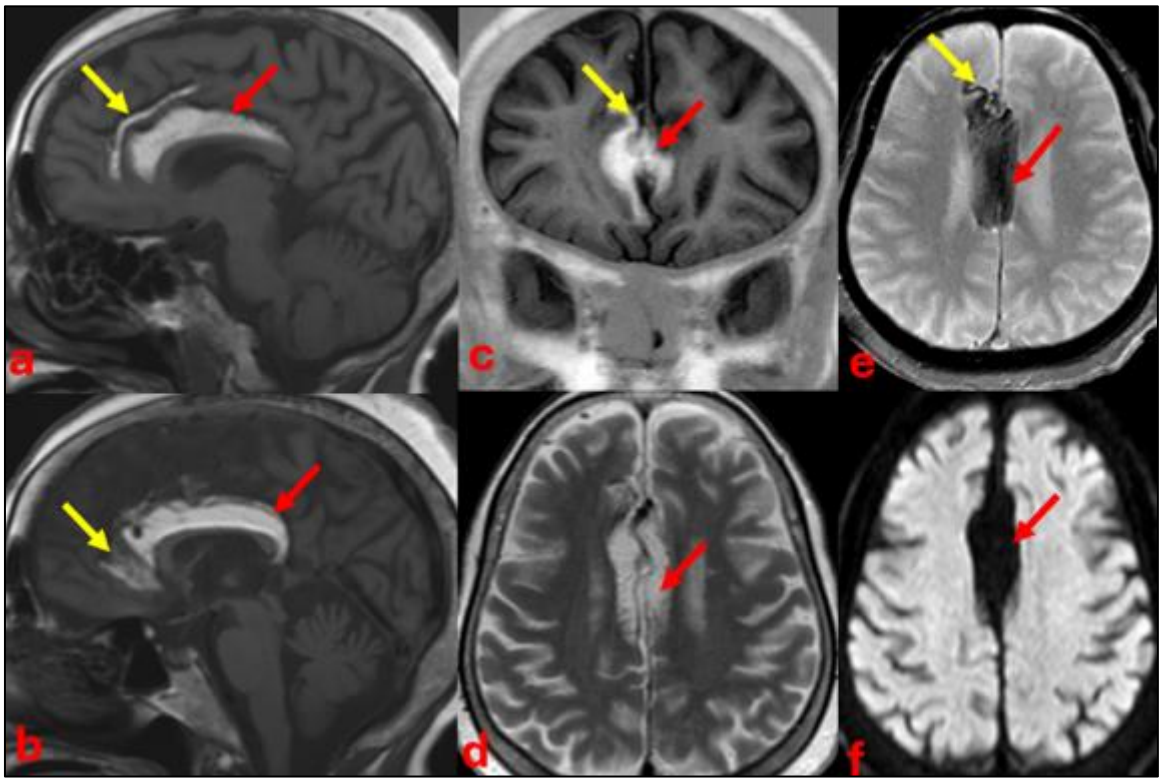


Figure 1: Multisequence brain MRI demonstrating a pericallosal dermoid cyst and evidence of focal rupture. (a, b) Sagittal T1-weighted images (c) Coronal T1-weighted image with inversion recovery (d) axial T2-weighted image without fat suppression (e) axial T2-weighted gradient-echo (GRE) image with fat suppression (f) Diffusion-weighted image. Red arrows indicate the dermoid cyst, while the yellow arrow highlights small fat droplets within the right frontal cortical sulci, consistent with focal rupture into the adjacent subarachnoid spaces.

Additionally, neuroradiological evaluation demonstrated an associated incidental midline cavum vergae anatomical variant and a few subcortical and periventricular white matter hyperintensities consistent with mild chronic small vessel ischemic changes (fig 2).

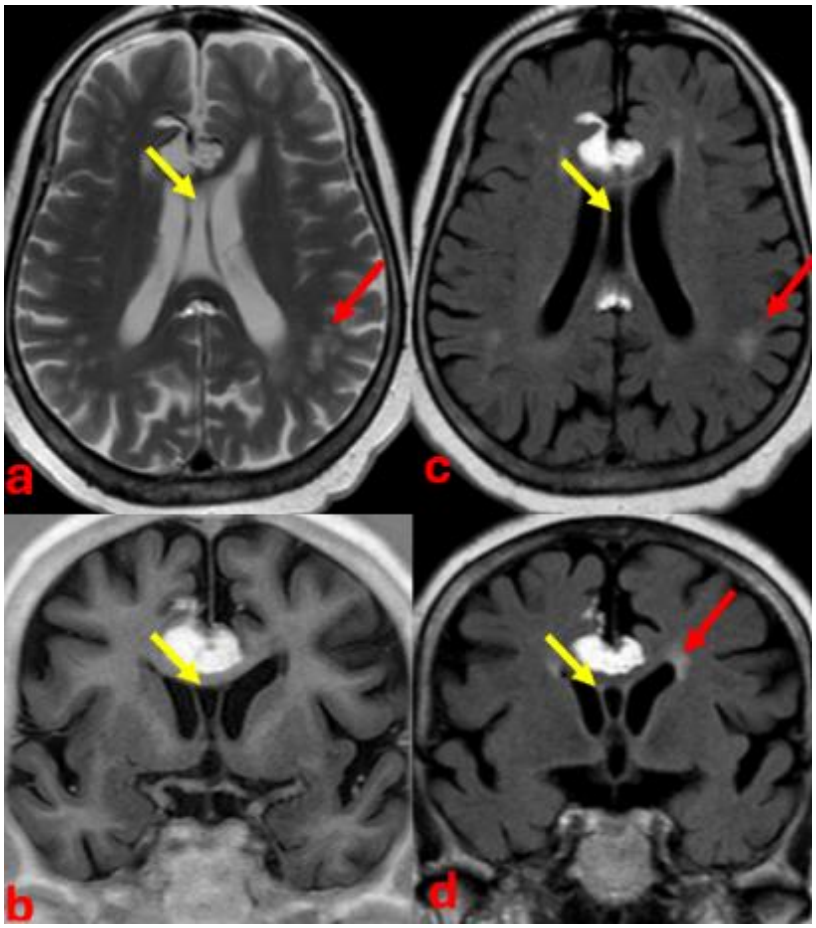


Figure 2: Multisequence brain MRI: (a) Axial T2-weighted image, (b) Coronal T1-weighted image with inversion recovery (IR), (c) Axial FLAIR image, (d) Coronal FLAIR image. Red arrows indicate scattered subcortical and periventricular white matter hyperintensities, consistent with mild chronic small vessel ischemic changes. The yellow arrow indicates an incidental midline cavum vergae.

The patient was immediately optimized with intravenous levetiracetam and dexamethasone, and scheduled for surgery. A right frontal craniotomy was performed via an interhemispheric approach to access the pericallosal space. Microsurgical exploration revealed a hyperemic, reactive regional arachnoid membrane with localized, greasy lipid droplets confined within the adjacent right frontal sulci, confirming the localized rupture. The cyst wall was opened, and its internal matrix—consisting of dense sebum, epithelial flakes, and hair shafts—was thoroughly debulked. Due to dense inflammation-induced adherence to the pericallosal arteries and the corpus callosum, a conservative subtotal resection was performed to prevent anterior cerebral artery infarction, followed by copious warm saline irrigation.

Postoperatively, the patient was managed in the neuro-intensive care unit. Intravenous dexamethasone was and transitioned to a structured oral taper over 14 days to counteract chemical arachnoiditis, and oral levetiracetam was maintained at a therapeutic dose of 1000 mg twice daily. Postoperative EEG demonstrated normal background activity without epileptiform discharges. The postoperative recovery was uneventful; headaches completely resolved by day 3, follow-up imaging confirmed stable subtotal resection and successful clearance of the sulcal fat droplets without complications. The patient was discharged on day 7 and remained completely seizure-free and neurologically intact at her 6-month follow-up.

3 DISCUSSION

The clinical presentation of a ruptured midline intracranial dermoid cyst depends entirely on the containment of the capsule breach. While a gross rupture floods the CSF axis, a localized rupture represents a distinct, contained variant where the escaped lipid secretions remain physically trapped within regional sulci. In this 62-year-old patient, the clinical picture was dominated by a focal-to-bilateral tonic-clonic seizure and localized headaches rather than generalized chemical meningitis, as the toxic sebaceous material was strictly confined to a few adjacent right frontal cortical sulci, acting as an active epileptogenic focus.

Multi-sequence MRI is the gold standard for diagnosing a localized dermoid cyst rupture. On non-contrast CT, small sulcal fat droplets can easily be misidentified as pneumocephalus. On MRI, the pathognomonic hallmark is the high signal intensity of these localized subarachnoid droplets on T1-weighted sequences. The combined evaluation of T2, FLAIR, DWI, and T2*-weighted (GRE) sequences is critical to comprehensively map the mass, evaluate the true extent of the localized rupture, and delineate associated baseline neuroanatomic characteristics like the concurrent cavum vergae variant observed in this case.

Surgical management of a localized subarachnoid dermoid rupture focuses on mass decompression and eliminating the regional chemical irritant. Complete capsule extirpation is frequently counterindicated, as the chronic inflammatory reaction securely anchors the capsule wall to vital midline neurovascular structures like the pericallosal arteries. Subtotal microsurgical resection combined with exhaustive, targeted irrigation of the involved frontal cortical sulci effectively eliminates the inflammatory lipid burden, while structured postoperative care focusing on steroid tapers and strict antiepileptic management ensures an excellent long-term prognosis.

4 CONCLUSION

Localized rupture of an intracranial dermoid cyst is an uncommon presentation that may be overlooked in the absence of extensive intracranial fat dissemination. This case highlights the importance of meticulous multi-sequence MRI assessment, as the identification of small fat droplets within adjacent cortical sulci may be the only imaging clue to rupture. Early recognition of this subtle finding is essential for accurate diagnosis and appropriate surgical management.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the article.

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