



Case Report

Traumatic rupture of intracranial dermoid cyst with continuous fat droplet migration

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ABSTRACT

Background: The intracranial dermoid cyst (ICD) can be complicated by rupture and spilling of its contents with potentially dreadful consequences. Head trauma as a predisposing element for this phenomenon is extremely rare. Few reports address the diagnosis and management of trauma-related rupture of ICD. However, there is a pronounced knowledge gap related to the long-term follow-up and the fate of the leaking contents. Here, we present a unique case of traumatic rupture of ICD complicated by continuous fat particle migration within the subarachnoid space with its surgical implications and outcome.

Case Description: A 14-year-old girl had an ICD rupture following a vehicle collision. The cyst was located near the foramen ovale with intra and extradural extensions. Initially, we opted to follow the patient clinically and radiologically as she had no symptoms, and the imaging showed no red flags. Over the next 24 months, the patient remained asymptomatic. However, the sequential brain magnetic resonance imaging revealed significant continuous migration of the fat within the subarachnoid space, with the droplets noticed to increase in the third ventricle. That is considered an alarming sign of potentially serious complications impacting the patient's outcome. Based on the above, the ICD was completely resected through an uncomplicated microsurgical procedure. On follow-up, the patient is well, with no new radiological findings.

Conclusion: Trauma-related ruptured ICD may have critical consequences. Persistent migration of dermoid fat can be managed with surgical evacuation as a viable option to prevent those potential complications such as obstructive hydrocephalus, seizures, and meningitis.

Keywords: Asymptomatic, Intraventricular fat droplets, Ruptured dermoid, Surgical intervention, Traumatic rupture

INTRODUCTION

Intracranial dermoid cysts (ICD) are infrequent tumor-like ectodermal inclusion cysts.^[1,14] ICDs form during the first trimester at the convergence of neural tube closure. Their location is usually related to the midline with particular affinity to the posterior fossa and suprasellar again. The presentation of ICD varies from incidental findings to signs of increased intracranial pressure due

to mass effect. The rupture of the ICD is a rare phenomenon. It can be presented with increasing headaches and seizures due to the dissemination of the dermoid contents into the subarachnoid space and the ventricles. Most ruptures occur spontaneously as a consequence of the continuous increase in the size of intracystic contents as compared to the cyst wall. In very rare instances, traumatic brain injury can be the trigger that predisposes to such ruptures.^[8,12,15] After rupture, the cyst's contents spread, culminating in a wide range of complications such as hydrocephalus and meningitis, which are induced by the intracranial migration of the ruptured cyst's contents into the subarachnoid space and ventricles.^[14] However, the surgical significance of the chronological radiographic findings of fat droplet migration has not been reported to the extent; we are aware. Here, we present a unique case of traumatic rupture of ICD complicated by continuous fat particle migration within the subarachnoid space and the cerebral ventricular system with its surgical implications and outcome.

CASE SCENARIO

A neurologically intact 14-year-old girl presented to the office; she had post head trauma due to a motor vehicle

accident. Her imaging included a brain magnetic resonance imaging (MRI) and head computed tomography scan that showed a right middle cranial fossa mass located near the foramen ovale and extended both intra and extradurally. It appeared restricted on diffusion-weighted imaging with a hypointense signal in T1 and hyperintense in T2, coupled with fat droplet presence in the nearby basal subarachnoid region [Figure 1]. In addition, minor enhancement of the capsule on the coronal and sagittal pictures was apparent [Figures 1c and d]. We planned to monitor her clinically and radiologically since she was asymptomatic.

A serial brain MRI [Figure 2] over 24 months disclosed a significant alteration in the extent of the dermoid cyst's ruptured status, which is the continual migration of fat droplets inside the subarachnoid space from the collateral sulcus. The follow-up MRI at 7 months showed the fat droplet had drifted into the quadrigeminal cistern and the posterior part of the collateral sulcus. The subsequent MRI, 7 months later, exhibits further spreading of the fat droplets approaching the third ventricle. Although the patient remained asymptomatic, those radiological modifications, combined with the patient's young age, could be a red flag of future deterioration, such as chemical meningitis and

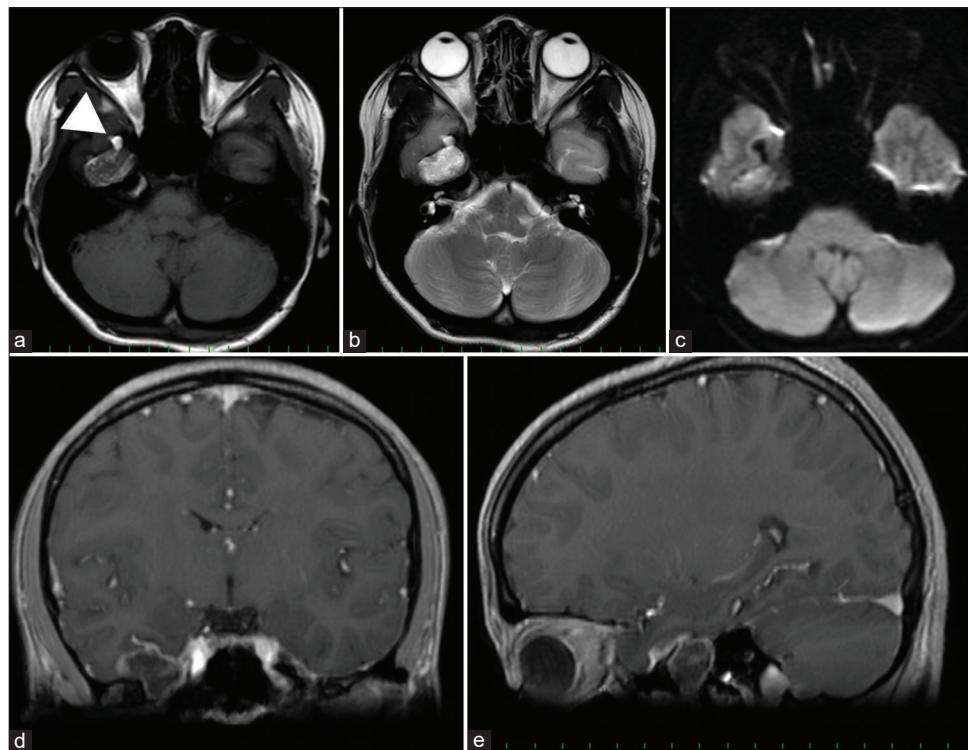


Figure 1: Initial magnetic resonance imaging MR images show hypointense in T1 (a), hyperintense in T2 (b), with restricted diffusion on DWI (c). Fat droplets in the subarachnoid space nearby the tumor was also noted (arrowhead). (d and e): The coronal and sagittal images with gadolinium shows the slight enhancement of the tumor capsule and also the mass locating both intradurally and extradurally at foramen ovale.

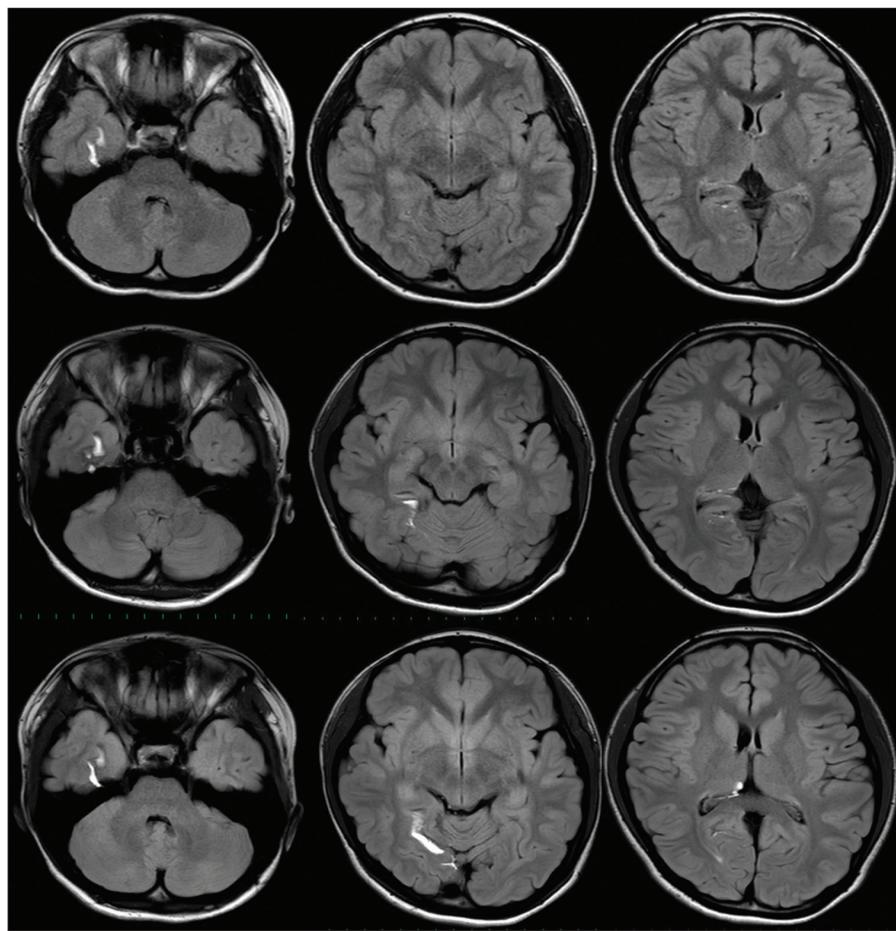


Figure 2: Chronological magnetic resonance imaging (MRI) changes in a patient after traumatic rupture of dermoid cyst. Upper: The initial MRI showing fat droplets in the adjacent collateral sulcus. Middle: 11 months later, MRI shows migration into the posterior part of the collateral sulcus and quadrigeminal cistern (not shown in this view). Lower: Final MRI showing the fat droplet further migrates into the third ventricle.

hydrocephalus. Hence, we performed complete surgical resection through a combined extradural and intradural right subtemporal approach [Figure 3]. Intraoperatively, there were fat lumps and hair tufts. The postoperative path went smoothly and discharged home 1 week later. The histological finding confirmed the dermoid cyst [Figure 4] and the proceeding MRI verified the entire resection with no evidence of ventricular dilation [Figure 5].

DISCUSSION

ICDs, which form between 0.04% and 0.6% of all intracranial neoplasms and are primarily benign congenital inclusion cysts, develop during embryogenesis from ectopically misplaced surface ectoderm.^[7] ICDs usually manifest in the midline, often intradural, yet very rarely extradural.^[11] Sellar/parasellar space and posterior fossa are common sites where ICDs are reported; however, complex dermoid is detected in numerous intracranial and extracranial compartments.^[7] Our

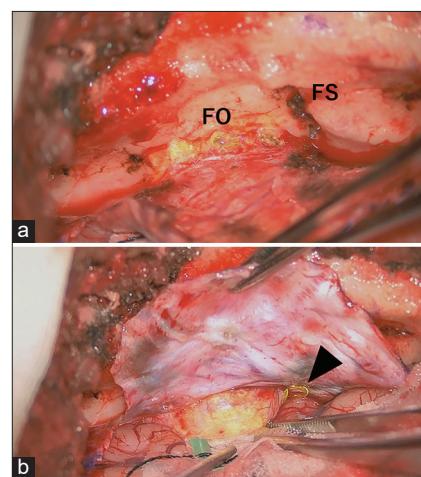


Figure 3: Intraoperative microscopic photos (a) Extradural part of dermoid cyst. FO: Enlarged foramen ovale, FS: Foramen spinosum. (b) Intradural part of the dermoid with a fat droplet (arrowhead).

current case combines intradural and extradural extension and is located near the foramen ovale in the right temporal base.

Rupture can happen as a result of trauma or less commonly as a result of cyst growth. When the ICD bursts, its contents of cholesterol particles will float in the subarachnoid space and spread widely.^[13] Typically, these plumes last for years without being absorbed.^[9] There were only 13 cases of ICD rupture due to trauma documented and reviewed by Taha *et al.*^[17] These reports focused on clinical and radiological follow-up along with potential postoperative problems, but none of them delved into details regarding what happened to

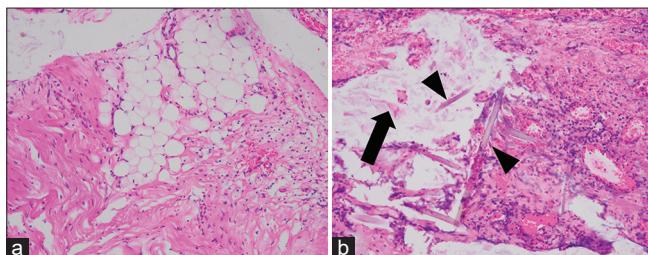


Figure 4: Histopathological findings (hematoxylin and eosin staining) (a) fatty tissue and collagen fibers (b) hair shafts (arrowheads) and keratin debris (arrow).

the fatty particles inside the arachnoid space.^[2-4,8,10,12,19] Here, we observe a prolonged radiological follow-up that confirms sustained deposition and modifications in the destination of fat granules. In 2008, Liu *et al.* asserted that headaches (57%) and seizures (42%), followed by hydrocephalus (29%), as the most classic symptoms of spontaneous rupture.^[6] Moreover, in traumatic rupture, patients might experience chemical meningitis (7%), seizures (30%), temporary motor or sensory impairments (16%), traumatic rupture headache (32%), or remain asymptomatic.^[2,16,18] Our patient was asymptomatic beyond a transient headache that vanished on its own. Definitive surgical excision is the cornerstone of ICD treatment, used to manage symptomatic ICDs as a result of mass effects or when they rupture; while conservative treatment, according to Kosuge *et al.*, is an option for the patient with a minor headache or manageable convulsions.^[5] She was young (14 years old) and asymptomatic, but the prolonged follow-up MR revealed the unabated excretion of fatty particles along with their migration into the third ventricle as well as into adjacent subarachnoid spaces. We opted to eliminate the lesion to avoid any potential adverse effects linked to fat particles' continuous movement. To the extent of our knowledge, no articles had documented ongoing fat redistribution following the traumatic rupture

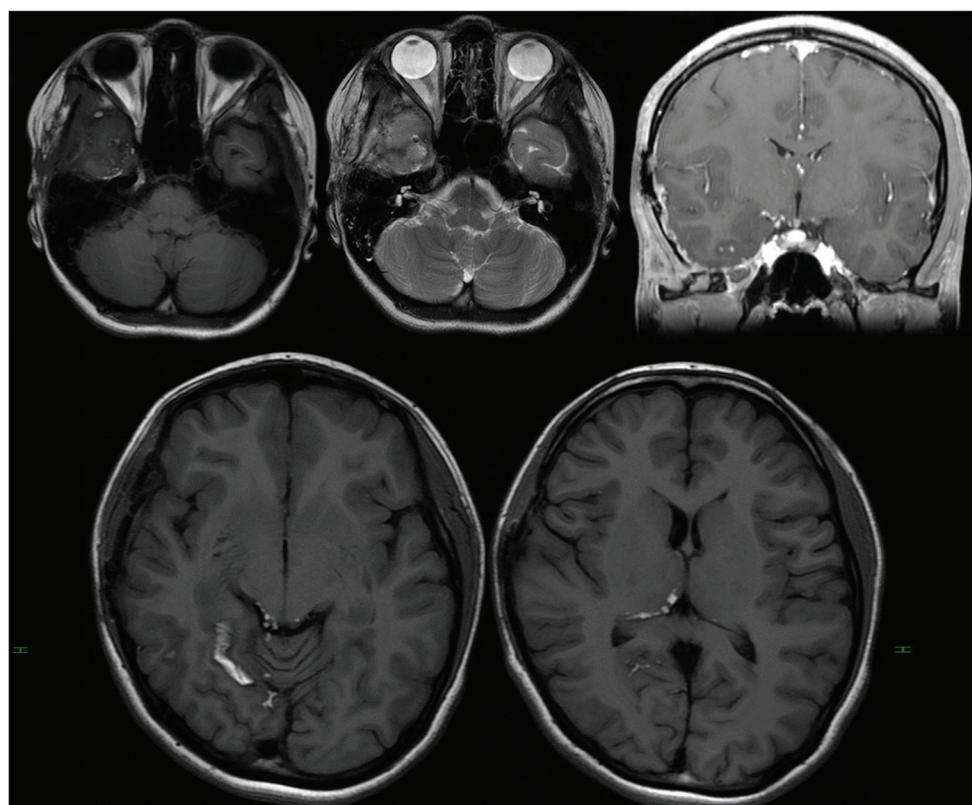


Figure 5: One-month postoperative magnetic resonance imaging images show complete removal of the ruptured dermoid cyst, with fat droplets in the subarachnoid space, no change in their sites, and no hydrocephalus.

of an intracranial dermoid cyst. Our patient evidenced persistent relocation of these oily molecules within the subarachnoid space and approached the third ventricle; inevitably, these unusual radiological findings are deemed an alarming sign toward switching the management strategy to surgical intervention, particularly in young patients.

CONCLUSION

The trauma-related ruptured ICD contents within the intracranial spaces may have critical consequences. Persistent migration of dermoid fat can be managed with surgical evacuation as a viable option to prevent those potential complications such as obstructive hydrocephalus, seizures, and meningitis.

Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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