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Case Report

# Atypical chronological changes on neuroimaging in the epidermoid in the frontal lobe with intracystic hemorrhage and tumor growth: Case report

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ABSTRACT

Intracranial epidermoids are rare lesions accounting for 0.2%-1.8% of all intracranial tumors. They commonly develop in the cerebellopontine angle and the parasellar region and can appear with atypical neuroimaging features due to intracystic hemorrhages which complicate diagnosis. The authors present a case of a 62-year-old woman with a frontal epidermoid cyst with a hemorrhage and tumor growth. A series of atypical radiological findings showed gradual changes in the lesion appearance that were confirmed with surgery and histopathology. To avoid surgical complications such as chemical meningitis, it is important to remember that epidermoid cysts occasionally bleed, leading to atypical MRI and/or CT findings and diagnostic difficulties. Development of epidermoid cysts in atypical locations in the brain may result in challenges to accurate diagnosis.



## Introduction

Epidermoids are developmental benign lesions accounting for 0.2%-1.8% of all intracranial tumors, emerging at any life stage, with a median onset at age 40. Growth is linear, mainly at the cerebellopontine angle and parasellar region, and intradural locations may be associated with headaches, visual disturbances, hypothalamic alterations, or aseptic meningitis (caused by cystic rupture) [1–6]. Epidermoid cysts appear hypodense on computed tomography (CT) and do not accumulate contrast media [3]. On magnetic resonance

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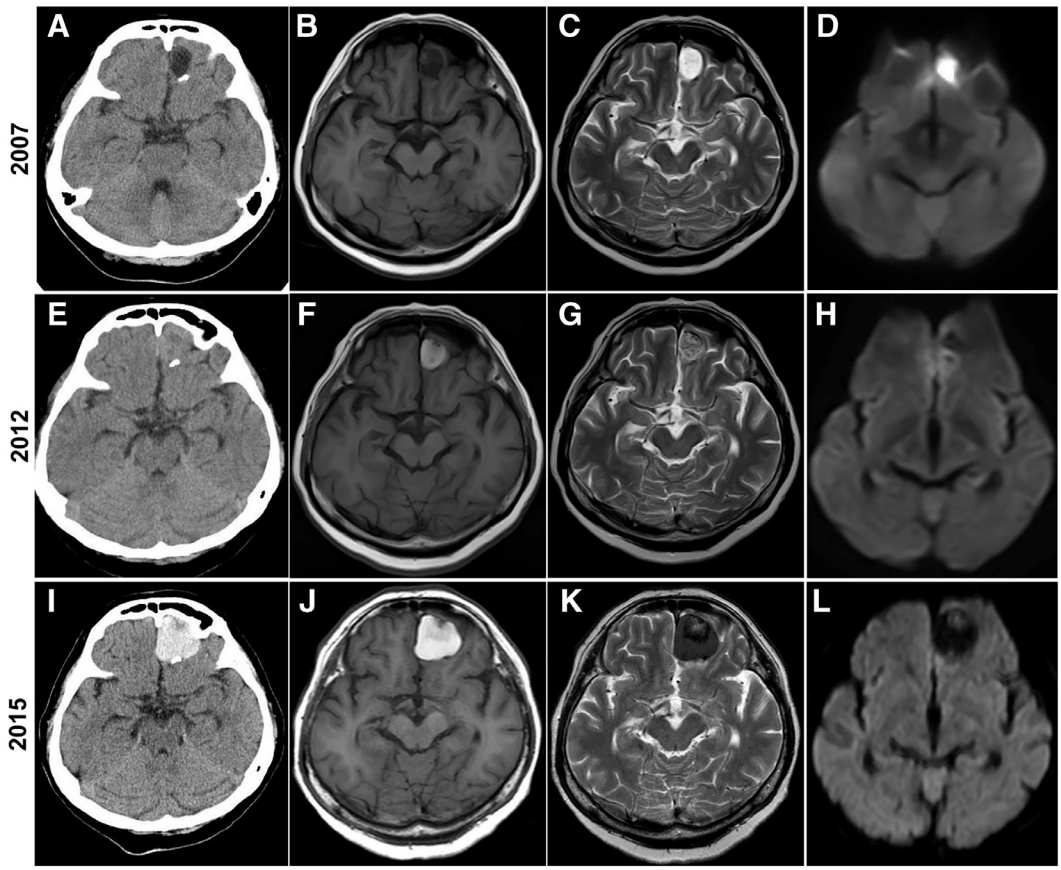


**Fig. 1 – Initial and follow-up CT and MRI.** May 2007: **Homogenously hypodense mass of 13 x 21 x 16 mm in the left frontal lobe with a focus of calcification on CT scan (A), low signal intensity on T1-weighted images (T1WI) (B), and high signal intensity on both T2-weighted images (T2WI) (C) and Diffusion-weighted imaging (DWI) (D).** November 2012: **Density change in the mass without significant size change on CT (E), high signal intensity on T1WI (F), and heterogeneously increased signal intensity on T2WI (G); indistinct on DWI (H).** November 2015: **Enlargement of the cyst with homogenously high density on CT (I), T1WI with increased signal (J) compared to the previous image (F), low signal intensity on T2WI (K), and DWI (L).**

imaging (MRI), they show low signal intensity on T1-weighted images (T1WI), high signal intensity on T2-weighted images (T2WI), and are not contrasted by gadolinium [3,4]. Diffusion-weighted imaging (DWI) enables greater accuracy in differentiating epidermoids [1,5,7,8]. In some cases, atypical findings on MRI can greatly complicate the diagnosis [8]. We report just such an occurrence; a rare intraparenchymal epidermoid cyst developed in the frontal lobe with atypical radiological findings.

## Clinical case

A 62-year-old woman presented with tonic convulsions, but no other neurological symptoms were noted after the convulsions abated. CT demonstrated a hypodense mass of $13 \times 21 \times 16$ mm in the left frontal lobe with calcified foci (Fig. 1A) and the MR signal intensity of the lesion was lower than the grey matter on T1WI and higher on both T2WI and DWI (Fig. 1B-D). This unenhanced result on postcontrast MRI was indicative of an epidermoid cyst. The patient received an anticonvulsant and was followed up by serial imaging without surgical intervention. Five years later, the lesion size had not changed significantly but was isodense on CT scans (Fig. 1E). MRI showed a high-intensity signal on T1WI (Fig. 1F) and a heterogeneously increased signal on T2WI (Fig. 1G), though indistinct on DWI (Fig. 1H). Such changes suggested minor intracystic bleeding and further follow-up was without surgical intervention.

Three years later, the patient presented with a dull headache. The lesion had increased in size to $28 \times 32 \times 25$ mm with marked hyperdensity on CT scans (Fig. 1I), increased signal intensity on T1WI (Fig. 1J) compared to previous images, a heterogeneous, low intensity signal on T2WI (Fig. 1K), and low intensity on DWI (Fig.1L). These findings prompted surgical intervention.

A left frontal craniotomy was performed. The cortex incision revealed an encapsulated mass in the frontal lobe. After greenish-brown fluid was aspirated, the pearly white inner layer of the capsule and the sawdust-like mass were observed. The capsule was removed completely.

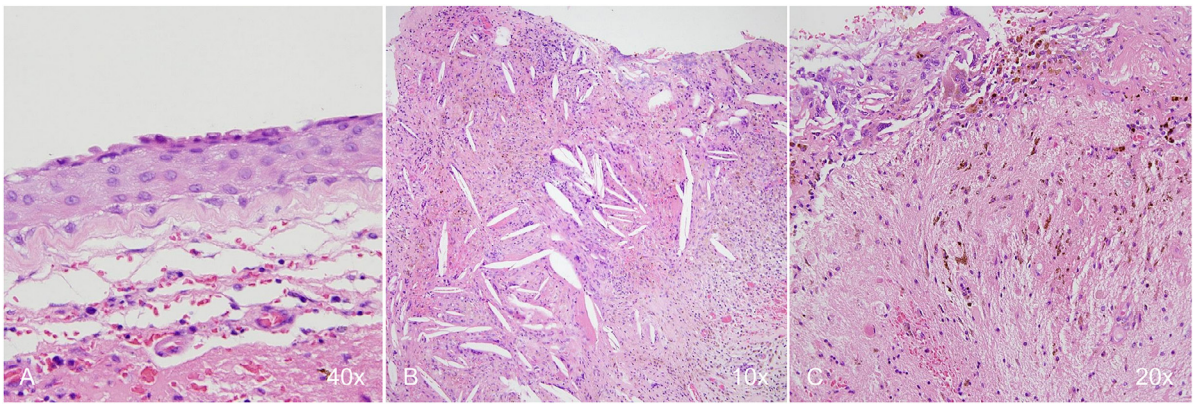


**Fig. 2 – Histological examination of the cyst. Stratified squamous epithelial cells in the cyst lining. 40× (A), the mass filled with keratin and cholesterol clefts, surrounded by inflammatory cells. 10× (B), and an old hemorrhage indicated by scattered hemosiderin deposition within the mass. 20× (C). H & E staining.**

Histological examination revealed stratified squamous epithelial cells in the cyst lining (Fig. 2A). The mass was filled with keratin and cholesterol clefts were surrounded by inflammatory cells (Fig. 2B). The borders of an old hemorrhage were delineated by hemosiderin depositions scattered within the mass (Fig. 2C). No hair follicles or sebaceous glands were observed histologically which pointed toward an epidermoid cyst.

## Discussion

Among intracranial epidermoids, intraparenchymal locations account for less than 1.5% with 33% of those in the frontal lobe [1,2,5,7]. Epidermoids with atypical features on neuroimaging can be preoperatively misdiagnosed with dermoids or other intracranial lesions [8–10].

Horowitz et al. described epidermoid cysts as “white” when they appear as a bright mass on T1WI due to high lipid content (including mixed triglycerides containing polyunsaturated fatty acid residues) without cholesterol [11]. In our patient, T1WI from 2015 demonstrated high signal intensity that could be referred to as white epidermoids; however, MRI showed low intensity on T2WI that could not be described solely as lipid content. As bleeding was confirmed through both surgical observation and histopathology, we concluded that the high signal on T1-weighed images and the low signal on T2WI were the result of a subacute hemorrhage.

In our case, the intra-axial epidermoid cyst with atypical radiological features was found in the frontal lobe. Both CT and MR scan characteristics changed over time causing difficulties in accurate diagnosis without initial neuroimaging data. Ren et al. found that out of 428 patients with intracranial epidermoid cysts, 24 (5.6%) of them showed atypical radiological manifestations and 87.5% of those appeared to have microscopic hemorrhaging [8]. Among 24 cases with atypical radiological findings, 14 had different preoperative diagnoses when dermoids (20%) were most frequently diagnosed before surgery. As bleeding was visually confirmed during surgery and histological examination, this confirmed that the high T1WI signal intensity and low T2WI signal intensity actually resulted from subacute hemorrhaging. The cystic growth rate and the intraoperative finding of the hemorrhage indicated that rapid enlargement of this particular epidermoid cyst was due to repetitive hemorrhages.

## Conclusion

Intracranial epidermoid cysts are rare tumors and atypical imaging features may mimic other intracranial lesions as a result of bleeding and chemical processes. To avoid surgical complications such as chemical meningitis, it is therefore important to remember that epidermoid cysts occasionally bleed, leading to atypical MRI and/or CT findings and diagnostic difficulties. Development of epidermoid cysts in atypical locations in the brain may result in challenges to accurate diagnosis.

## Informed consent

Informed consent was obtained from the patient included in the study.

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2018.07.022.

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