RESEARCH PAPER

Giant Epidermoid Cyst of the Cavum Septum Pellucidum with White Matter Tract Displacement on Diffusion Tensor Imaging

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ABSTRACT

Epidermoid cysts arising within the cavum septum pellucidum are uncommon midline intraventricular lesions that may closely resemble cerebrospinal fluid on conventional magnetic resonance imaging. A 36-year-old man presented with a two-year history of progressive memory impairment. Three-tesla magnetic resonance imaging demonstrated a large lobulated midline cystic lesion measuring 48 × 68 × 56 mm centered in the cavum septum pellucidum, with signal characteristics mirroring cerebrospinal fluid on T1- and T2-weighted sequences and incomplete suppression on fluid-attenuated inversion recovery. Diffusion-weighted imaging revealed marked restricted diffusion with low apparent diffusion coefficient values, suggesting an epidermoid cyst, which was subsequently confirmed on histopathological examination. Diffusion tensor imaging demonstrated bilateral lateral displacement of corona radiata projection fibers and thinning of corpus callosum commissural fibers, suggesting predominant tract displacement. The patient underwent neurosurgical management, and histopathological examination confirmed an epidermoid cyst. This case highlights the complementary value of diffusion-weighted imaging in suggesting the diagnosis and of diffusion tensor imaging in pre-operative tract mapping..

Keywords: Epidermoid cyst; Cavum septum pellucidum; Diffusion-weighted imaging; Diffusion tensor imaging; White matter tract displacement; Magnetic resonance imaging...

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INTRODUCTION

Epidermoid cysts are congenital inclusion lesions that arise from ectodermal remnants and are reported to account for approximately 1% of intracranial tumors.[1] They most commonly occur in the cerebellopontine angle and parasellar region. Intraventricular epidermoid cysts are uncommon, and those centered primarily within the cavum septum pellucidum have been described only rarely in the literature. On conventional magnetic resonance imaging, these lesions may closely follow cerebrospinal fluid signal intensity and may be mistaken for arachnoid cysts. Diffusion-weighted imaging is the principal sequence that distinguishes the two entities.[4] Diffusion tensor imaging adds further pre-operative information by demonstrating the relationship of the lesion to adjacent white matter tracts.[5] We report a case of a giant epidermoid cyst of the cavum septum pellucidum, confirmed histopathologically, in which diffusion tensor imaging demonstrated predominant displacement of the surrounding white matter tracts.

Case Report

A 36-year-old man presented with a two-year history of progressive forgetfulness and difficulty retaining recent events. He also reported multiple transient episodes of loss of consciousness approximately three years prior to presentation. There were no seizures, focal neurological deficits, visual disturbances, or other comorbidities. Neurological examination was unremarkable. Routine laboratory parameters were within normal limits.

Magnetic resonance imaging of the brain was performed on a 3-tesla scanner with standard multiplanar sequences and diffusion tensor imaging. A large lobulated, smoothly marginated midline cystic lesion measuring 48 × 68 × 56 mm (transverse × anteroposterior × craniocaudal) was identified within the cavum septum pellucidum, abutting the undersurface of the body of the corpus callosum [Figure

1]. The lesion appeared hypointense on T1-weighted images, hyperintense on T2-weighted images, and showed incomplete suppression on fluid-attenuated inversion recovery sequences, producing the typical "dirty cerebrospinal fluid" appearance. Diffusion-weighted imaging demonstrated marked restricted diffusion with correspondingly low apparent diffusion coefficient values. Post-contrast T1-weighted sequences showed no appreciable enhancement.

The mass effect was substantial. The body of the corpus callosum was thinned and displaced superiorly, the lateral ventricular walls were displaced laterally, and the septal and thalamostriate veins were compressed and displaced. There was no associated hydrocephalus.

Diffusion tensor imaging demonstrated bilateral lateral displacement of the corona radiata projection fibers, thinning and displacement of the commissural fibers of the corpus callosum, and circumferential displacement of association fibers in both hemispheres around the lesion [Figure 2]. Fractional anisotropy values within the lesion were low, while anisotropy in the surrounding displaced peri-lesional tracts was relatively preserved, suggesting predominant tract displacement.

Imaging findings suggested an epidermoid cyst of the cavum septum pellucidum. The patient was referred for neurosurgical evaluation and subsequently underwent neurosurgical excision of the lesion at another institution; operative records and intraoperative images were therefore not available for inclusion in this report. Histopathological examination of the excised specimen revealed a thin fibrocollagenous cyst wall lined by stratified squamous epithelium showing keratinization. The cyst lumen contained abundant laminated keratin flakes and debris. No adnexal structures were identified. These findings confirmed the diagnosis of an epidermoid cyst. Post-operative clinical and imaging follow-up details were not available at the time of manuscript preparation.

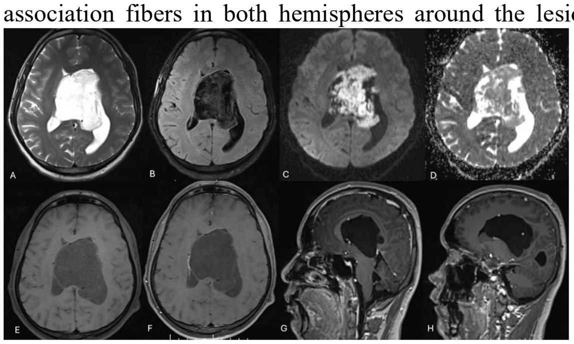

Figure 1: Thirty-six-year-old man with progressive memory impairment. Magnetic resonance imaging of the brain demonstrates a large lobulated midline cystic lesion centered in the cavum septum pellucidum. (a) Axial T2-weighted image shows a hyperintense cystic lesion with thinning of the corpus callosum and bilateral lateral ventricular compression. (b) Axial fluid-attenuated inversion recovery image shows heterogeneous incomplete suppression ("dirty cerebrospinal fluid" appearance). (c) Axial diffusion-weighted image demonstrates marked restricted diffusion within the lesion. (d) Axial apparent diffusion coefficient map shows correspondingly low values. (e) Axial pre-contrast T1-weighted image demonstrates the hypointense midline lesion. (f) Axial post-contrast T1-weighted image shows no appreciable enhancement. (g) and (h) Sagittal post-contrast T1-weighted images demonstrate the full craniocaudal extent of the lesion, with superior displacement and thinning of the corpus callosum, midline ventricular compression, and no appreciable enhancement of the lesion.

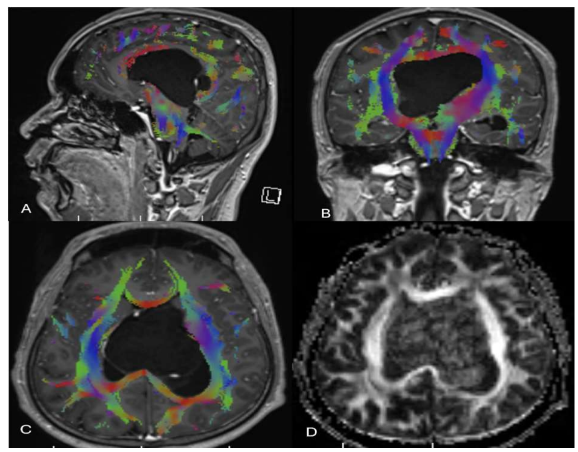

Figure 2: Diffusion tensor imaging of the same patient. (a) Sagittal diffusion tensor imaging color map shows absent fiber tracts within the lesion with peri-lesional tract displacement. (b) Coronal diffusion tensor imaging color map demonstrates bilateral lateral displacement of corona radiata fibers and thinning of corpus callosum commissural fibers. (c) Axial diffusion tensor imaging color map confirms circumferential displacement of association and projection fibers around the lesion. (d) Axial fractional anisotropy map shows low fractional anisotropy within the lesion, indicating absence of organized white matter fibers, with relatively preserved anisotropy in the surrounding displaced tracts

Discussion

The cavum septum pellucidum is a midline anatomical variant formed by incomplete fusion of the septal leaflets and is present in a variable proportion of the adult population. A range of cystic lesions may occupy this space, including colloid cysts, arachnoid cysts, and, less commonly, epidermoid cysts.[1] Primary epidermoid cysts of the cavum septum pellucidum are uncommonly reported in the English-language literature. The indolent growth pattern of these lesions accounts for their protracted symptomatic course, as illustrated in the present case in which a lesion of nearly 7 cm in its largest dimension was associated with two years of memory impairment without overt hydrocephalus or focal deficits.

On conventional T1- and T2-weighted sequences, epidermoid cysts may follow cerebrospinal fluid signal intensity closely, and the diagnosis may not be considered until diffusion-weighted imaging and fluid-attenuated inversion recovery sequences are reviewed.[2,3,4] The hallmark finding of restricted diffusion is attributed to constrained water movement among densely packed desquamated keratin lamellae and is the principal feature that differentiates an epidermoid cyst from an arachnoid cyst, the latter showing free diffusion.[3,4] This distinction is of practical importance: the operative approach, the risk of chemical meningitis from cyst content spillage, and the expected post-operative course differ meaningfully between the two entities.

Histopathological confirmation in the present case supports the diagnostic value of diffusion-weighted imaging in differentiating epidermoid cysts from other cerebrospinal fluid-like intraventricular cystic lesions. The restricted diffusion observed on diffusion-weighted imaging in epidermoid cysts is attributed to densely packed keratinaceous debris and desquamated epithelial material;[2,3] in the present case, this corresponded histologically to abundant laminated keratin flakes within the cyst lumen, providing direct radiologic–pathologic correlation.

Diffusion tensor imaging in the present case provided additional pre-operative information by demonstrating predominant displacement of the surrounding white matter tracts, with relatively preserved fractional anisotropy in the peri-lesional fiber bundles. Demonstration of preserved displaced tracts may be useful for pre-operative planning by clarifying the relationship of the lesion to eloquent white matter pathways.[5]

The principal limitations of this report are that surgical management was undertaken at another institution, with operative records and intraoperative images unavailable for review, and that post-operative clinical and imaging follow-up details were not available at the time of manuscript preparation.

This case highlights the role of diffusion-weighted imaging in suggesting the diagnosis of an intraventricular epidermoid cyst, subsequently confirmed histologically, and the supplementary value of diffusion tensor imaging in pre-operative assessment of adjacent white matter architecture.

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given consent for clinical information and images to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of Interest

There are no conflicts of interest.

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