Case lesson 53/2026

A Case Report of an Intracranial Solitary Fibrous Tumor with Torcular Invasion

"The only good thing about torcular meningiomas is that they are rare" Leonard Malis

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Introduction: Solitary fibrous tumors (SFTs) are rare mesenchymal neoplasms of fibroblastic origin, accounting for approximately 0.5%–1% of central nervous system tumors. Historically, SFTs and hemangiopericytomas were considered distinct entities; however, the identification of the NAB2–STAT6 gene fusion led to their unification into a single pathological entity [1]. According to the 2021 World Health Organization (WHO) classification of central nervous system tumors, SFTs are now categorized into three grades based on mitotic activity and the presence of necrosis. Although many SFTs follow an indolent course, higher-grade lesions exhibit a significant risk of recurrence and distant metastasis, with reported recurrence rates of up to 70% and metastatic potential of approximately 28%. Radiologically, intracranial SFTs frequently mimic meningiomas due to their dural-based location and homogeneous contrast enhancement, making preoperative diagnosis particularly challenging [2].

Case presentation: A 51-year-old female presented with a three-week history of occipital headache of moderate intensity, associated with pulsatile tinnitus. She had no significant past medical history, and neurological examination was unremarkable. Magnetic resonance imaging of the brain revealed a right occipital lesion characterized by a central cystic component with internal septations, infratentorial extension, and invasion of the torcular Herophili (Figure 1+2). The lesion demonstrated homogeneous contrast enhancement. Based on these imaging findings, the initial differential diagnosis included meningioma and solitary fibrous tumor. The presence of cystic degeneration and complex internal architecture raised suspicion for a diagnosis other than a typical meningioma, prompting further evaluation and management planning. Surgery was performed and GTR was achieved (Figure 3). Biopsy confirmed the diagnosis of Solitary fibrous tumor (Figure 4).

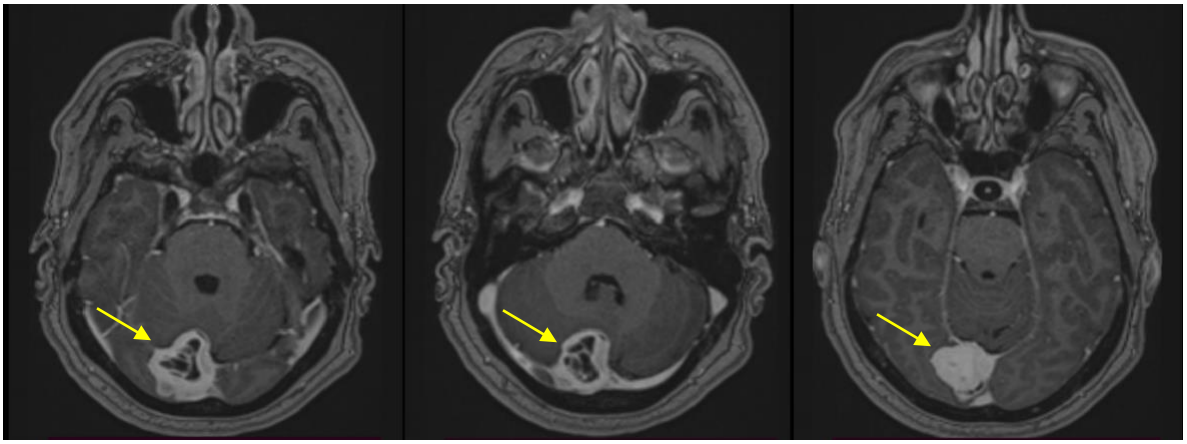

Figure 1: *pre-surgery MRI showing the right occipital lesion with homogenous contrast enhancement in axial T1-gadolinum sequence (yellow arrow)*

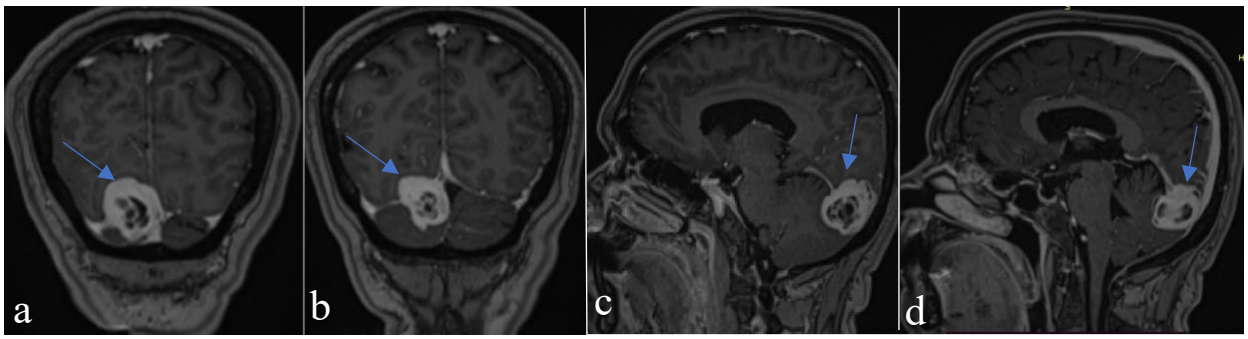

Figure 2: *pre-surgery MRI showing the right occipital lesion and invasion of the torcula in coronal (a+b) and sagittal (c+d) T1-gadolinum sequence (blue arrow)*

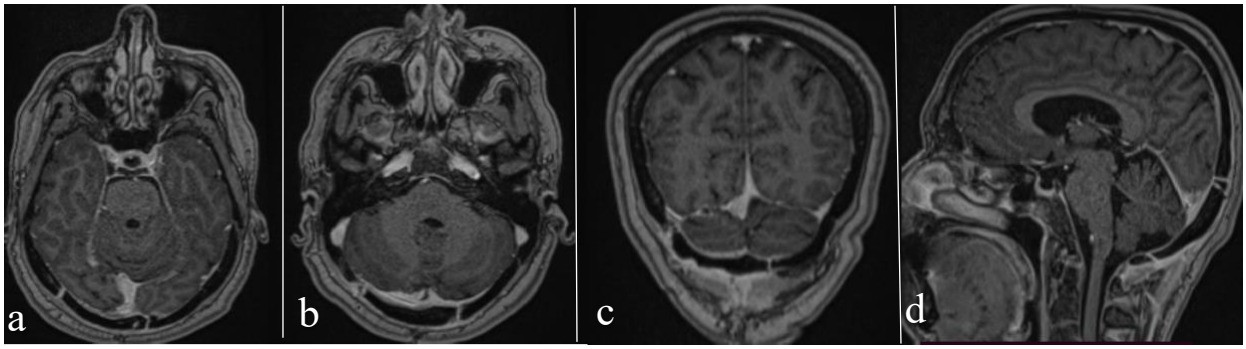

Figure 3: *post-surgery MRI after GTR of the lesion in T1-gadolinum sequence: (a+b) axial view, (c) coronal view, (d) sagittal view*

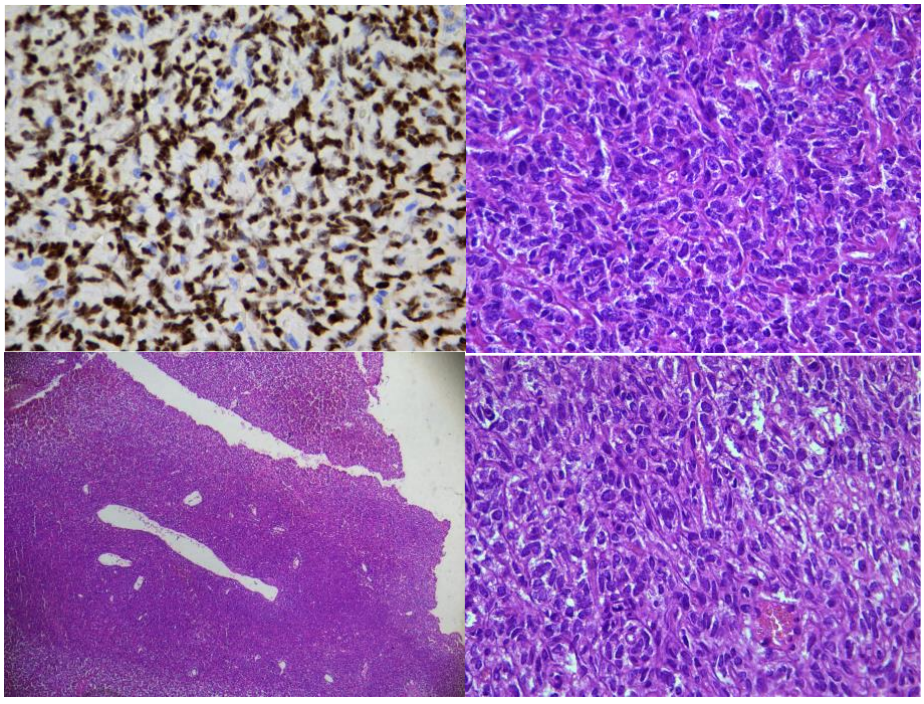

Figure 4: *Sections show a cellular mesenchymal neoplasm composed of spindle cells arranged in a patternless architecture with alternating hypercellular and hypocellular areas. The tumor cells have oval to spindle-shaped nuclei with mild to moderate atypia and scant cytoplasm. Prominent branching ("staghorn") vascular channels are identified. Areas of collagen deposition are present. Mitotic activity is less than 1 per 10 high-power fields. Necrosis is absent.*

Immunohistochemistry:

STAT6: Positive (strong nuclear staining), SOX10: Negative, Cytokeratin AE1/AE3: Negative, Progesterone receptor (PR): Negative

Discussion: Intracranial SFTs pose a significant diagnostic challenge due to their radiological similarity to meningiomas. Both lesions commonly present as dural-based masses with well-defined borders and homogeneous enhancement on imaging studies. However, certain imaging features may help distinguish SFTs, including the presence of cystic changes, heterogeneous internal structure, and relatively less peritumoral edema compared to meningiomas. Despite these differences, definitive diagnosis relies on histopathological and immunohistochemical analysis. The differential diagnosis for SFTs includes meningioma, angiomatous meningioma, and other dural-based tumors such as sarcomas or metastases. Advanced imaging modalities, including diffusion-weighted imaging and susceptibility-weighted imaging, may provide additional clues; however, significant overlap remains, and imaging alone is often insufficient for accurate diagnosis [1, 3].
The primary treatment modality for intracranial SFT is surgical resection, with gross-total resection representing the most important prognostic factor. Studies have demonstrated that complete resection significantly improves both progression-free survival and overall survival compared to subtotal resection [2]. In cases where complete resection is not feasible, adjuvant radiotherapy is recommended, particularly for higher-grade tumors, as it has been shown to improve local tumor control and prolong progression-free survival. For advanced or metastatic disease, systemic therapies have limited established efficacy; however, targeted agents such as pazopanib have shown some promise in selected cases [1].

A particularly important aspect of the present case is the involvement of the torcular Herophili, a rare and surgically challenging location for intracranial tumors. Lesions arising in or invading the torcular region are uncommon and represent a significant technical challenge due to the complex venous anatomy and the critical role of this structure in cerebral venous drainage. The torcular confluence serves as the junction of the superior sagittal, straight, occipital, and transverse sinuses, and surgical manipulation in this area carries a substantial risk of venous infarction, massive hemorrhage, and life-threatening complications. Furthermore, SFTs are often highly vascularized and may invade adjacent venous sinuses, further increasing operative complexity. Achieving gross-total resection in such cases is not always possible [2, 4]. In certain situations, subtotal resection may be preferred to avoid catastrophic venous injury, with adjuvant radiotherapy playing a complementary role. In his ten-year retrospective study for peritorcular meningiomas, Al Mefty reported 14 cases and their management depending on the extent of tumor invasion in torcular wall. They developed a classification of peritorcular meningioma involvement in the torcular wall consisting of four progressive types (types I–IV) (Figure 5). In type I, the tumor involves the dural wall without involving the endothelial layer or displacing or stenosing the vein. Type II tumors involve the dural layer without invading the venous endothelial layer but do stenose or displace the sinus by compression. In types I and II, resection of the cleavage plane can be performed in the meningeal fibrous layer. In type III, the endothelium layer is disrupted and the tumor has penetrated the lumen, whereas in type IV, the tumor has completely occluded the sinus [4].

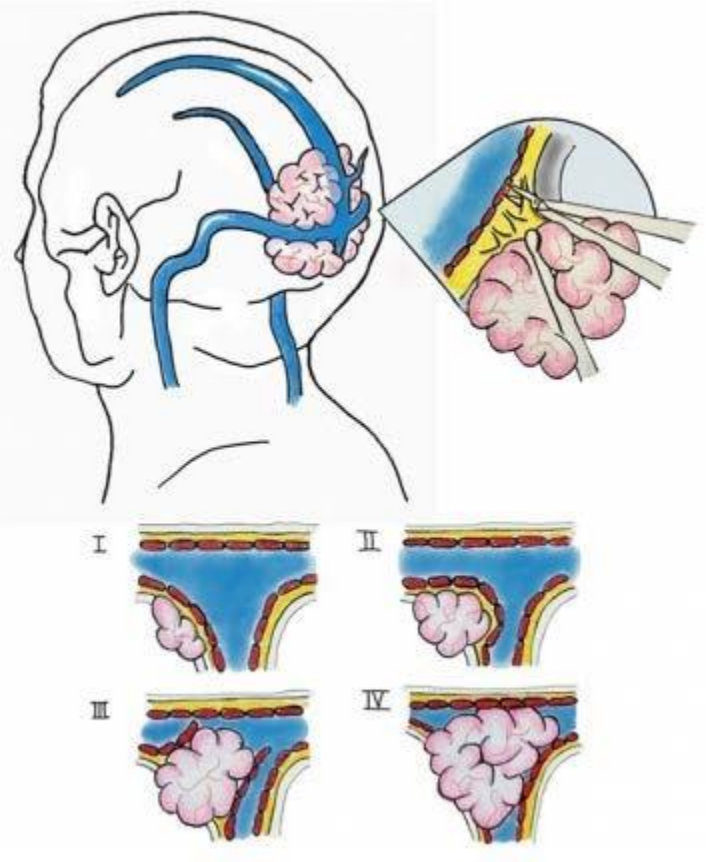

Figure 5. *Colored pencil drawing of a torcular meningioma resection showing sharp dissection of the tumor off the inner venous component of the torcular wall (inset) and the four types of tumors: distant tumor with intact endothelial layer (I), tumor compressing but not invading the endothelial layer (II), invasion of the endothelial layer (III), and total occlusion of the torcula (IV). Red indicates endothelial cells; yellow, subendothelial elastic, smooth muscle, and collagenous cell layers; white, fibrous dura; and pink, meningioma [4]*

The rarity of SFTs in this location, combined with their vascular nature and potential sinus invasion, makes their surgical management particularly demanding and underscores the need for individualized, multidisciplinary treatment strategies. Prognosis in SFT is strongly influenced by tumor grade, extent of resection, and histopathological features such as mitotic activity and necrosis. Higher-grade tumors are associated with increased rates of recurrence, reduced survival, and a higher likelihood of metastasis. Importantly, even in cases with initially favorable outcomes, SFTs have the potential for late recurrence and distant spread, underscoring the necessity for long-term follow-up and surveillance imaging [3].

Conclusion: Intracranial solitary fibrous tumors are rare entities that can closely mimic more common tumors such as meningiomas on imaging studies. The presence of atypical features, including cystic degeneration and involvement of venous structures such as the torcular Herophili, should raise suspicion for alternative diagnoses. Accurate diagnosis requires histopathological confirmation, with STAT6 immunostaining playing a key role. Gross-total resection remains the cornerstone of treatment, while adjuvant radiotherapy may be necessary in selected cases. Given the potential for recurrence and metastasis, particularly in higher-grade tumors, long-term follow-up is essential. This case highlights the importance of recognizing the diverse presentation of SFTs and their inclusion in the differential diagnosis of intracranial dural-based lesions.

References:

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