

## Case Report

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# Unusual Intracranial Parasagittal Meningioma Extending into the Internal Jugular Vein through the Sinuses

Meningiomas frequently invade cerebral venous sinuses, especially parasagittal meningioma to superior sagittal sinus. However, most invasions do not reach internal jugular vein. We present a case of parasagittal meningioma extending into the internal jugular vein through the sinuses. Radiological investigation revealed that the tumor was invading the sagittal, transverse, sigmoid sinus and junction of the internal jugular vein to subclavian vein, which was filled with tumor. The histopathological examinations revealed that both the cerebral tumor and mass in the internal jugular vein contributed to the transitional meningioma. This is a rare case of a meningioma extending into the internal jugular vein through the sinuses. According to this case, the frontal parasagittal meningioma could invade directly the internal jugular vein. The significance of this association to cerebral venous sinuses and internal jugular vein are discussed.

**KEY WORDS :** Meningioma · Jugular vein · Cranial venous sinus.

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## INTRODUCTION

Meningiomas are benign tumors that are derived from the arachnoid villous structures of the meninges and are common in the central nervous system<sup>4</sup>). Meningiomas frequently invade cerebral venous sinuses, especially parasagittal meningioma to superior sagittal sinus<sup>5,6</sup>). Often its invasion leads to the obstruction of the superior sagittal sinus, that may give dilemma to neurosurgeons whether to sacrifice such sinus<sup>4,5</sup>). As in this case, the involvement to internal jugular vein through the venous sinus drainage from frontal parasagittal meningioma have been reported to be rare<sup>4,5</sup>). Here, we report an unusual presentation of parasagittal meningioma extended to internal jugular vein through interposing sinuses with the review of the literature.

## CASE REPORT

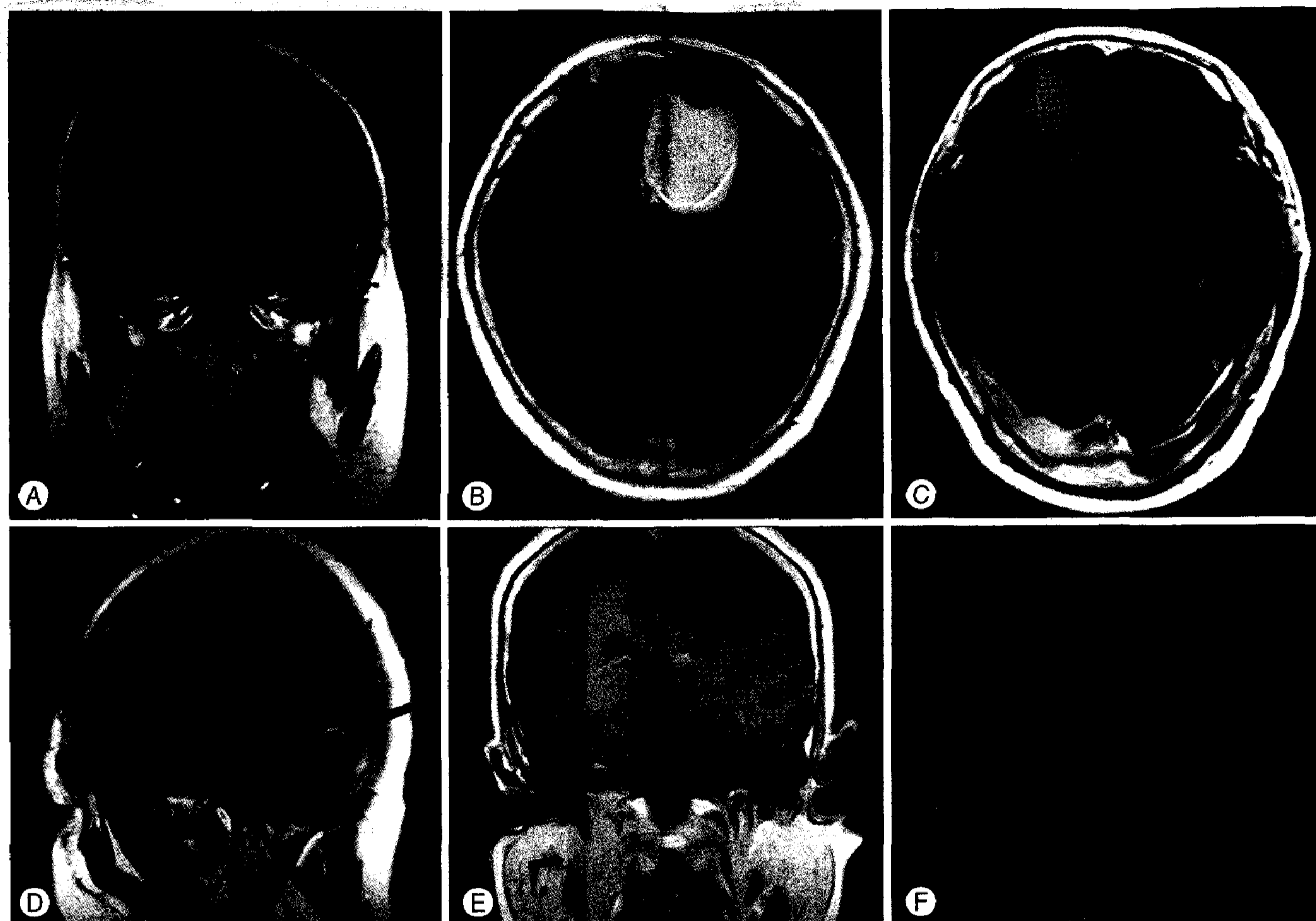
A 48-year-old man was admitted to our hospital with progressive headache that had been present for 2 months. The findings of neurological examination were not remarkable except mild left hemiparesis.

Magnetic resonance (MR) imaging revealed a left frontal, well-enhanced extra-axial round mass lesion accompanied by cerebral edema and midline shifts. T1- and T2 weighted images showed a homogeneous iso-signal intensity mass that crossed the right frontal lobe via the falx (Fig. 1A). The radiological finding of a frontal mass was compatible with parasagittal meningioma. The tumor mass extended to the right internal jugular vein through the superior sagittal, right transverse and sigmoid sinuses (Fig. 1B, C, D, E). The involved sinuses and right internal jugular vein were observed to have bulging contour and showed the same signal intensity as that of the primary frontal tumor mass. In right common carotid angiogram, the mass of right sigmoid sinus was supplied by tentorial branches of the right occipital artery and jugular branches of the right ascending pharyngeal artery (Fig. 1F).

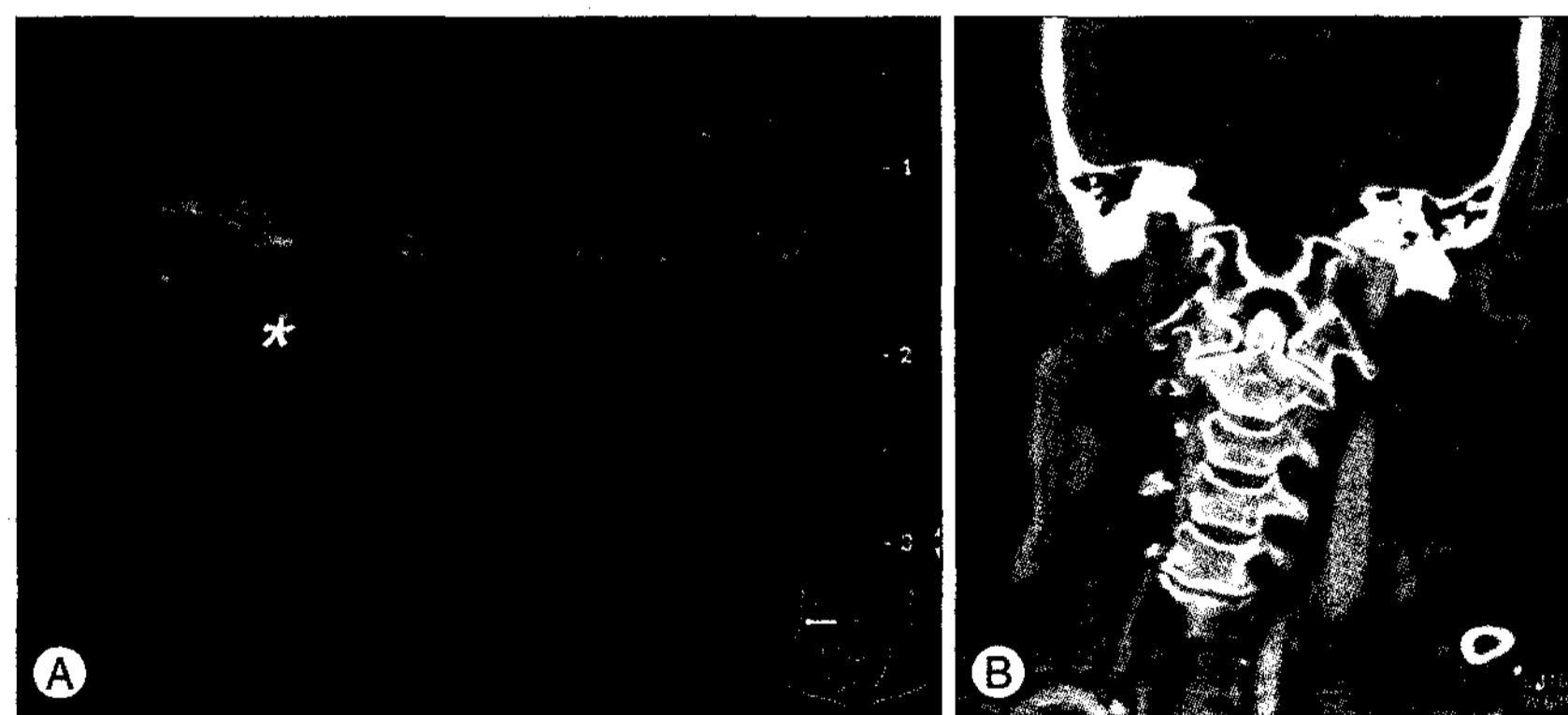
Venous flow was not identified on Doppler ultrasonography of the right internal jugular vein and the jugular vein was not compressed due to the inner tumor mass (Fig. 2A). Several small vessels were observed in the jugular vein mass.

Preoperatively, we suspected that a parasagittal meningioma had invaded the right internal jugular vein through consecutive sinuses. The outline of the tumor was too long

• Received : March 12, 2008  
• Accepted : May 7, 2008  
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**Fig. 1.** Preoperative magnetic resonance imaging with contrast enhancement demonstrates that a parasagittal meningioma (A) with the same signal intensity in the sagittal sinus (B), transverse sinus (C), sigmoid sinus (D), and internal jugular vein (E). (Various arrows) In the angiogram, the mass of right sigmoid sinus is supplied by the extracranial arteries (F). (Two thin arrows)



**Fig. 2.** Enlarged and not-compressed internal jugular vein during ultrasonography is observed (A) (\* : heterogeneous tumor mass filled in right jugular vein at C3-4 level, mediolateral direction during the neck ultrasonography). Postoperative 6 months neck computed tomography angiographic image shows that internal jugular vein is filled with the tumor (B).

and complicated to be completely removed in a single operation. Therefore, the frontal extra-axial tumor was resected along with the overlying dura and skull. Histological examination revealed as transitional meningioma without anaplasia invading the dura mater.

A radiologist performed a biopsy on the mass in the right internal jugular vein under the ultrasonographic guidance

after surgery. Biopsy revealed that the histopathology of the internal jugular vein mass was the same as that of the main cerebral transitional meningioma (Fig. 3).

The patient refused consecutive operation for the cerebral sinuses and neck. He had no symptom and sign on the last postoperative one year follow-up. Internal jugular vein was filled with the tumor in the neck CT angiographic image of last visit.

## DISCUSSION

Approximately 6-17% of all meningiomas can be found in extracranial or extraspinal sites<sup>6</sup>. The head and neck are the most frequent locations of extraneuraxial meningiomas<sup>2</sup>.

Postoperative propensity of meningiomas to recur after surgery is linked not only to histological grade but also, to the degree of radicality in the surgical resection<sup>1</sup>. In the



**Fig. 3.** Histopathologic findings show combination of whirling and fascicular patterns of transitional meningioma (A) (Hematoxylin-Eosin, x100). Smear preparation of aspirated specimen from the internal jugular vein mass (B, C) shows nests of elongated cells with occasional single nucleolus (B : Papanicolaou stain, x400) and focal immunoreactivity of meningeal cells for epithelial membrane antigen (C : Peroxidase-anti-peroxidase stain, x400).

resection of meningiomas involving the major dural venous sinuses (superior sagittal sinus, transverse sinus, torcular, sigmoid), total removal with venous sinus may not avoid catastrophic postoperative complications<sup>4,5</sup>.

Extracranial meningiomas arise in three ways : one is direct extracranial extension through the adjacent structure mainly skull base, the second is extracranial growth from the arachnoid within the cranial nerve sheaths through neural foramina, and rarely, the third is the extension via the venous sinus through venous flow. Involvement of the internal jugular vein through the venous sinus drainage from the parasagittal meningioma as seen in this patient, is rare<sup>1-3</sup>. The mechanism of tumor extension of this case to internal jugular vein is not clear, but the authors draw a deduction to third way about the mechanism of this case.

There have been two other reported cases of intracerebral meningioma extending into the internal jugular vein<sup>2,3</sup>. One patient had a posterior fossa fibrous meningioma that extended into the internal jugular vein through the adjacent involved sigmoid sinus<sup>3</sup>. In other case, parasagittal meningioma and unrelated meningioma of the internal jugular vein were observed without the involvement of interposing sinuses<sup>2</sup>. To the best of present knowledge, our presented case is the first case of parasagittal meningioma extending into the internal jugular vein through consecutive sinuses.

The meningioma has been known to slow-growing tumor but the tumor extension of this case would go up to heart via subclavian vein. Therefore, cardiologic examination

should be carried out side by side neurosurgical examination. Though the patient refused the further surgery, radiosurgery or conventional radiotherapy will be an alternative therapeutic plan for residual tumor.

## CONCLUSION

The authors report an unusual case of parasagittal meningioma extending into the internal jugular vein through consecutive sinuses with a review of pertinent literature. In the treatment of meningioma, careful review on radiologic study results are mandatory.

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