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Case Report

A Subcortical Anaplastic Meningioma

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Meningioma without dural attachment usually occurs in the intraventricular region, the pineal region, and the sylvian fissure. However, subcortical meningioma located far from such locations is extremely rare. The authors report a case of subcortical anaplastic meningioma without any dural attachment in a 41-year-old woman.

KEY WORDS : Subcortical meningioma · Anaplastic meningioma · Meningioma without dural attachment.

Introduction

Meningioma without dural attachment, classified by Cushing and Eisenhardt[3], is usually located in the intraventricular or paraventricular region, the pineal region, and the sylvian fissure. However, subcortical meningioma without dural attachment is extremely rare. Such tumors at uncommon locations initially had led us to consider the following possibilities : high grade glioma and metastatic tumor etc. Anaplastic meningioma also has a prevalence of less than 10% of all meningiomas[9].

In this report, we describe a very rare case of a subcortical anaplastic meningioma without dural attachment with a review of the relevant literature.

Case Report

A 41-year-old female complaining sudden convulsion was referred to our hospital after undertaking brain magnetic resonance imaging(MRI), which showed a brain tumor in the right frontal lobe, at another hospital. There were no specific episode in her past and family history. On admission, she was alert and did not show motor and sensory abnormality. Preoperative MRI revealed an enhanced 4×3×3cm mass lesion located within right superior frontal sulcus, anterior to right precentral sulcus. The mass had a internal cystic change and severe peritumoral edema at inferior side. Dural attachment was not definite and a solid portion was well enhanced(Fig. 1). The differential diagnosis included high grade glioma, metastatic tumor, and meningioma.

A surgical resection was performed using a right fronto-parietal craniotomy. The dura mater was easily reflected. In operative finding, there were no thickening or increased vascularity at inner/outer side of dura mater. The mass was found to be free of dural attachment and underlying arachnoid membrane was well preserved(Fig. 2A). After incision of arachnoid membrane, a mass was found buried in subcortical superior frontal sulcus (Fig. 2B). Posterior surface of mass was covered by pia mater of adjacent gyri, but the dissection plane of antero-inferior surface was relatively poor. Finally, the tumor was completely

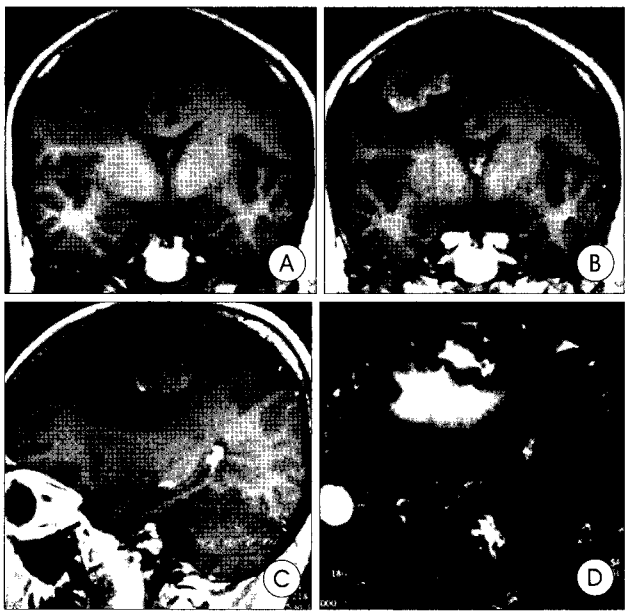

Fig. 1. Preoperative magnetic resonance(MR) imaging reveals a well demarcated tumor in the right frontal region. T1 coronal (A), T1 enhanced coronal (B), and T1 enhanced sagittal MR image (C) show homogeneous enhancement of mass lesion with central necrosis and no definite dural attachment. T2 sagittal MR imaging (D) shows peritumoral edema at inferior side.

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Fig. 2. No dural attachment and intact arachnoid membrane are found on the surface of the brain cortex (A). The subcortical mass is not seen until the arachnoid membrane is incised (B). After resection of tumor, it is totally removed (C).

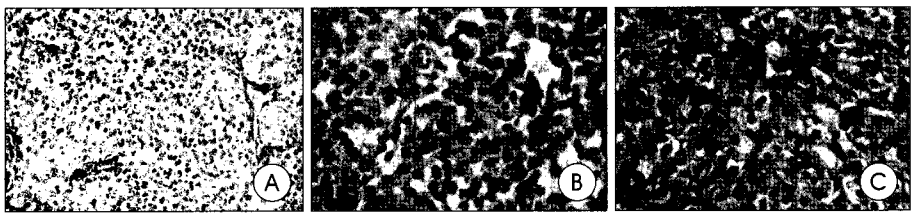

Fig. 3. Microphotographs of a surgical specimen. Ill defined cytoplasmic membrane, whorling of the tumor cell nests are noted. Tumor cells show increased cellularity and nuclear pleomorphism. Foci of brain invasion and necrosis are also seen ; (H & E, A : original magnification × 20, B, C : × 40).

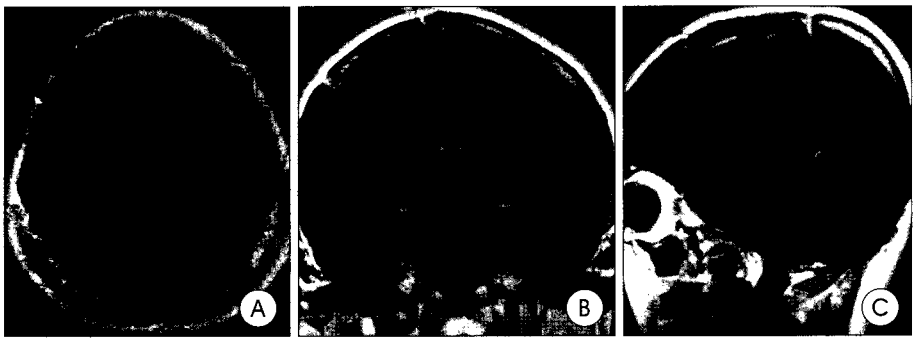

Fig. 4. Postoperative enhanced T1 axial (A), coronal (B), sagittal (C) magnetic resonance imaging show no residual mass eight months after operation.

removed and the operatvie finding suggested that the tumor was meningioma.

On pathological examination, the tumor cells showed histollogically malignant finding with increased cellularity, nuclear pleomorphism, prominent nucleoli and foci of brain parenchymal invasion, necrosis. They had elongated cytoplasms and ill defined cytoplasmic membranes. The tumor cell nests were found in a whirling form. They also demonstrated the feature of anaplastic meningioma(Fig. 3).

Postoperative enhanced MRI revealed no residual tumor 8months after surgery(Fig. 4) and the patient has had no clinical evidence of tumor recurrence for 15months.

Discussion

It is believed that meningiomas is originated from arachnoid cap or meningothelial cells that are usually present in the arachnoid layer of the meninges and in the pacchionian granulations. Arachnoid cap cells in arachnoidal or pial layers separate from the dura mater are present, thus some meningiomas may occur without any dural attachment[1,7]. Such meningiomas without dural attachment were first reported in 1938 by Cushing and Eisenhardt and were divided into four groups in 1969 ; (a) the wholly intraventricular tumors of the choroid plexus ; (b) the subcortical meningioma, partly embedded in the brain, most of which arise from the lateral margin of the superior tela ; (c) tumors of the deep sylvian cleft anchored to the internal carotid artery and its branches ; (d) an exceptional free subtentorial psammomeningioma of inconclusive origin[3,8]. With remarkable development in neuroradiology, it was easy to diagnose such meningiomas preoperatively, but it was still difficult to recognize subcortical meningiomas not located in the intraventricular region, the pineal region, and the sylvian fissure. In 1954, Emoto et al.[4] first described a subcortical meningioma as a meningioma without any dural attachment or connection to the sylvian fissure.

Subcortical meningiomas have been very rarely reported in reviews of the world literature, but all 4 cases except ours were found in Japan[10]. Also, Cho et al[2]. reported that 7cases of 10cases of deep sylvian meningioma were Japanese cases. The summary of previously reported subcortical meningioma did not show significant relationship with age or location of tumor (Table 1). All but one of 5 patients were female as is the high incidence rate of female in ordinary meningiomas. Anaplastic meningiomas constitute less than 10% of all meningiomas. However, 2cases, including ours of the 5patients had anaplastic type[9]. Three patients presented seizure, 1 patient hemiplegia, and 1 patient finger numbness. These presentations seem to be related with the tumor location.

A deep sylvian meningioma suggested by Cushing and Eisenhardt arises from leptomeningeal infolding in the sylvian

fissure[3]. A subcortical meningioma arises from arachnoid cells of the pia mater within the brain sulci[10]. Based on the similarities of the two meningiomas in the clinico-pathological characteristics, Hirao et al[5]. suggested a subcortical meningioma could be considered as a type of deep sylvian meningioma. Matsumoto et al[6]. supposed that arterial attachment to the MCA such as the dural tail sign, was useful for differentiating deep sylvian meningioma from subcortical meningioma,which was not present in our case.

Table 1. Cases of subcortical meningioma

Author	Sex/Age	Symptom	Location of tumor	Histology
Emoto S et al. (1954)	F/42	hemiplegia	Rt. central sulcus	fibroblastic
Morimoto M et al. (1976)	F/17	seizure	Lt. parietal	anaplastic
Miwa Y et al. (1982)	M/2	seizure	Lt. temporal	fibroblastic
Wada T et al. (2000)	F/45	finger numbness	Rt. central sulcus	chordoid
Present case (2002)	F/41	seizure	Rt superior frontal sulcus	anaplastic

Abbreviations : M = male ; F = female ; Rt = right ; Lt = left

Wada et al[10]. reported that evaluation of the form and location of peritumoral edema enable to differentiate between subcortical meningioma and high grade glioma or metastatic tumor. In our case, peritumoral edema was limited to the inferior side of the tumor, while in high grade glioma, peritumoral edema surrounded the whole tumor surface.

Subcortical meningioma without any dural attachment seems to be extremely rare, raising a great deal of confusion when comparing with such tumors. It can therefore be considered that subcortical meningiomas are included in differential entities of a solitary, enhanced intraaxial mass lesion. Due to limited informations about subcortical meningiomas, these should require further studies.

Conclusion

The authors report a case of subcortical meningioma without dural attachment. It is difficult to diagnose this case before surgery and it deserves a certain interest due to its rarity. It is necessary to recognize the possibility of occurrence of a meningioma in unusual locations.

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