CASE REPORT

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Strategy for the Patient with Tuberculum Sellae Meningioma Combining Bilateral Internal Artery Aneurysm

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A 43-year-old woman was admitted with the chief complaint of progressive visual disturbance and her brain radiological studies disclosed well demarcated tumor at tuberculum sellae area and bilateral mirror image paraclinoid internal carotid artery saccular aneurysms. A larger left side aneurysm was pointing medialy and almost encased by the tumor. Although a brain tumor and intracranial aneurysm can be simultaneously treated by surgery, the high risk of intra-operative aneurysm rupture should be considered. Therefore, the author secondly performed tumor resection after the endovascular embolization of the aneurysm which was embedding the tumor using a Guglielmi detachable coil. After successful treatment of the patient with tuberculum sellae meningioma associated with bilateral mirror image paraclinoid aneurysms using endovascular and surgical techniques, the authors present the case with a review of the related literatures.

KEY WORDS : Intracranial aneurysms · Tuberculum sellae meningioma · Endovascular embolization.

Introduction

The association between brain tumor and intracranial aneurysm is known as a very rare case and the incidence is probably between about 0.3% and 4%[2-4,6,8,9]. The most involved intracranial tumor associated with aneurysm is the meningioma, and its incidence is reported as about 0.5% by Taylor et al.[2]. In this case, surgical treatment can be useful by clipping the intracranial aneurysm and removing the tumor at the same time, but this involves some risk of a rupture of the intracranial aneurysm. The risk of rupture might be very high in case of an intracranial aneurysm encased by tumor, when the tumor and intracranial aneurysm need to be dissected.

The authors report the tumor removal, which was secondly performed through craniotomy after the treatment of the intracranial aneurysm using Guglielmi detachable coil(GDC) in order to prevent an intra-operative aneurysmal rupture.

Case Report

A 43-year-old woman was admitted to our hospital with a chief complaint of progressive bilateral visual disturbance from three years previously. Although she had the opthalomology examination for gradual decrease of visual acuity before coming to the hospital, and her opthalomology examination revealed left anopsia and optic atrophy, and right median hemianopsia, she had remained without any particular treatment until her admission. On neurological examination after admission, there was no particular findings except dilated left side pupil with loss of direct light reflex. In addition, the hormone and blood examination also showed nothing abnormal. The mass in the sellar and parasellar region was found to have a relatively clear margin and isodensity compared to the brain parenchyma on T2 weighted image (T2W) magnetic resonance(MR) image, and was shown to be 3.3cm × 2.6cm × 2.5cm (Fig. 1). In addition, the tumor was well enhanced on T1 W Gd-enhancement and it dislocated optic chiasm upwardly. The mass was extended to the suprasellar and tuberculum sellar area and its left lateral margin was embedded by about a 9mm-sized paraclinoid aneurysm (Fig. 2). Trans-femoral cerebral angiography demonstrated bilateral mirror image paraclinoid saccular aneurysms, and larger left side aneurysm was pointing medially (Fig. 3). The patient underwent endovascular embolization of the left

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internal carotid artery(ICA) aneurysm using GDC under general anesthesia. The reason why we coiled the aneurysm first was to avoid the risk of intraoperative aneurysmal rupture and to enable total tumor removal. Endovascular GDC embolization of the aneurysm was successfully carried out with complete occlusion of the aneurysm (Fig. 4). After coiling procedure the patient complained of pain and numbness of the left upper extremity and her follow up brain MR image showed focal infarction in the area of the sensory cortex. Following recovery of the patient's general condition, the open surgery was performed in order to remove the tumor and to treat the remaining aneurysm. After a bifrontal craniotomy, the solid mass around the tuberculum sellae was removed in piecemeal fashion. By debulking the tumor mass, already coiled a large left ICA(paraclinoid area) aneurysm was found. Intermingled coils in side of aneurysmal sac was visible through the pale wall. Right side paraclinoid aneurysm having broad neck was wrapped circumferentially with the temporalis fascia. The removed tumor bed was looked anemic without showing the remnant tumor(Simpson grade II). The pathological report of tumor mass was meningioma of meningotheliomatous type (Fig. 5). The patient was discharged in good condition without any newly developed postoperative neurological deficits.

Fig. 1. The mass in and supra-sellar region is found to have iso-density on brain T2W coronal magnetic resonance image (arrow head).

Fig. 2. T1W magnetic resonance image with Gd-enhancement showing well-enhanced mass that is extended to suprasellar area and dislocated optic chiasm upwardly(arrows). Signal void lesion suggesting aneurysm is shown in the mass at the left diaphragm sellar area(arrow head).

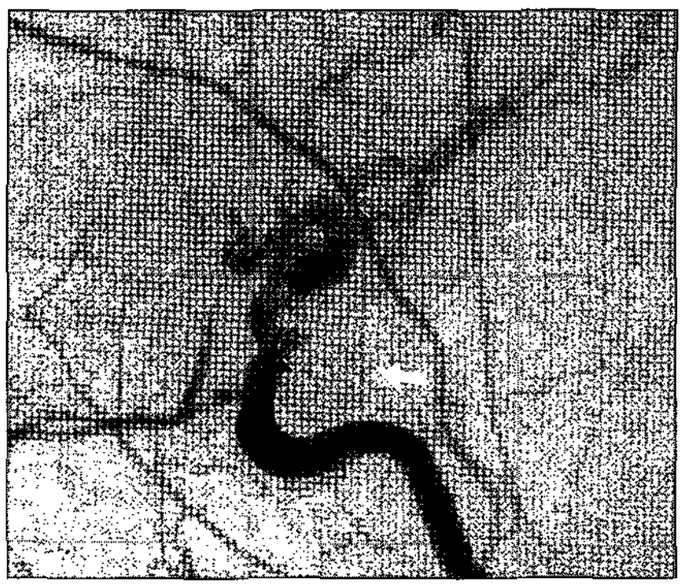

Fig. 4. The carotid angiography demonstrated left internal carotid artery aneurysm coiled by Guglielmi detachable coil(arrow).

Discussion

The association with intracranial aneurysm in brain tumor patients is very rare and its incidence is known to be 0.2~0.7%[5,7,8]. Nevertheless, recently a high incidence of 4% of aneurysms in brain tumors has been reported and the true incidence may be higher than is reported because the fourvessel angiography is not routinely performed for brain tumors[10].

The most involved intracranial tumor associated with aneurysm is the meningioma and others are also known, as follows : glioma, pituitary adenoma, and miscellaneous tumors including metastatic carcinoma[4].

The main symptoms of patients who have both tumor and intracranial aneurysm is more commonly related to the tumor, and Scamoni et al. reported that the first symptoms were related to the tumor in 78% of the cases, whereas the aneurysm was the cause of the first symptoms in 22%[10].

The localization of the aneurysms in this case is in accordance with Pia et al. : higher frequency of ICA aneurysm, followed by middle cerebral artery(MCA), anterior cerebral artery(ACA) and multiple group aneurysms[10]. In addition, Scamoni et al. stated that a close correlation exists between the loc-

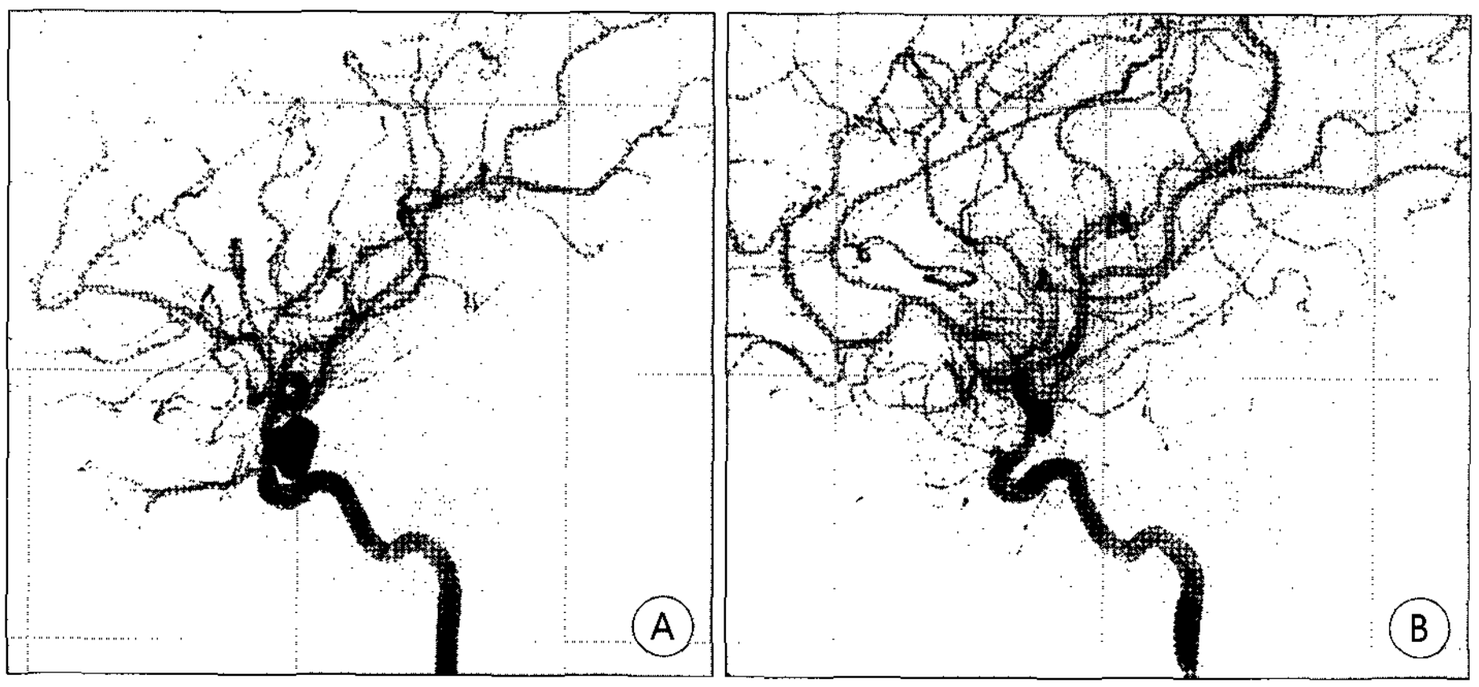

Fig. 3. A, B : The bilateral carotid angiography demonstrating mirror image paraclinoid internal carotid artery aneurysms(arrows).

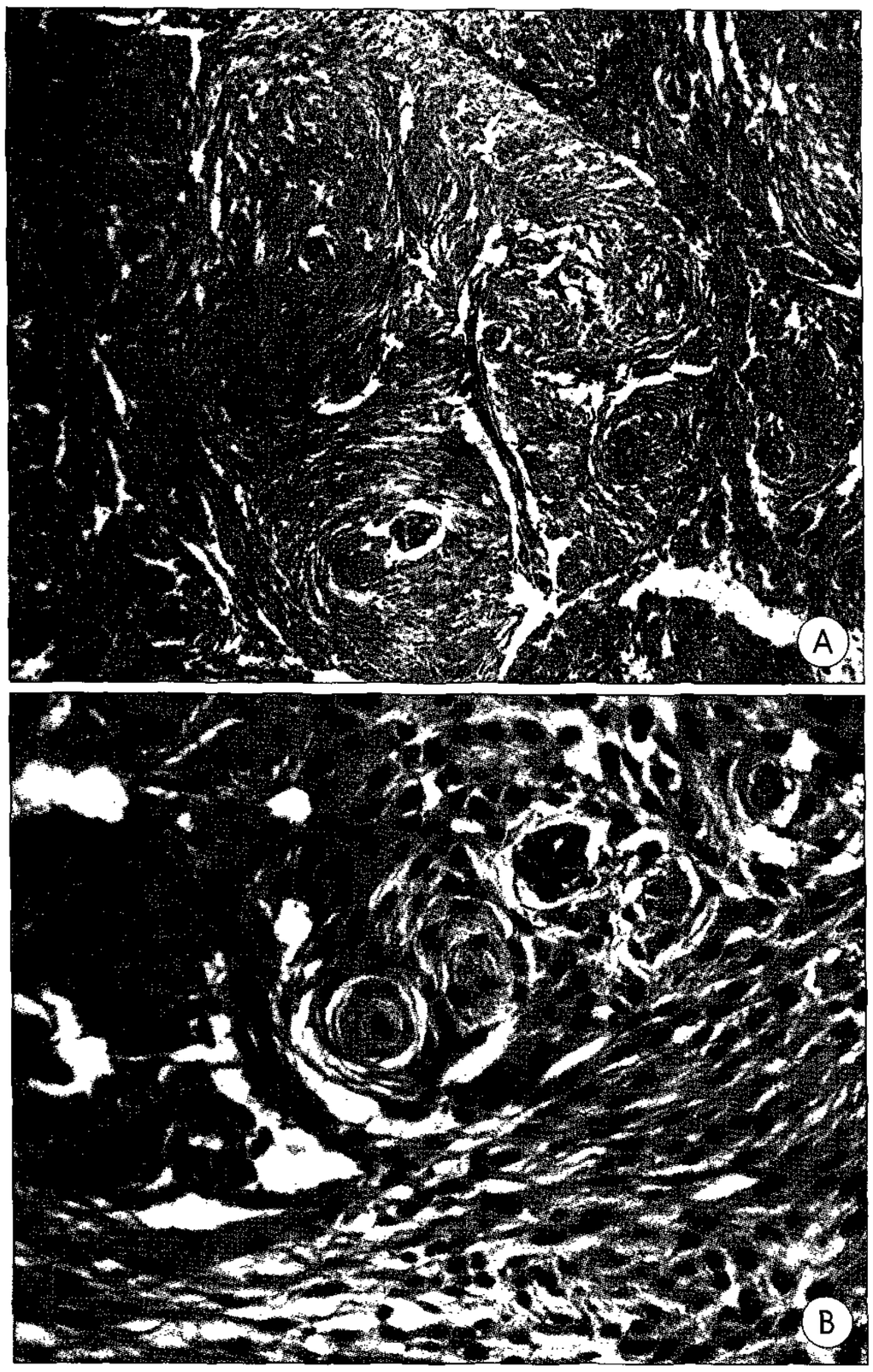

Fig. 5. A : *The tumor cells are arranged in whorls and focally admixed with dense collagen fibers (H&E, ×40).* B : *Most meningothelial tumor cells are oval to spindle with round nuclei. Whorls are prominent (H&E, ×200).*

ation of tumors and the location of an aneurysm and the artery most involved with aneurysms with convexity meningioma is the MCA, whereas in the basal meningiomas there is a predominance of ICA and anterior communicating artery aneurysms[4,9]. Although various mechanisms were studied to explain these correlations, it has been controversial until now. Kandal et al. stated the relation between aneurysm and MCA damage by tumor, based on the tumor adhesion in arterial adventitia[7,8], and Pia et al. reported the increased regional blood flow in high vascular tumors[3,4]. On the other hand, Ogino et al. demonstrated that a genetic background, stimulated vascular proliferation or simple coincidence were factors, since they could not detect the evidence of adhesion between the aneurysm and the tumor on the microscopic view[7]. The author did not find any evidence of adhesion between tumor and intracranial aneurysm on the microscopic view. The operative mortality was reported to be very high in the case of adhesion between tumors and intracranial aneurysm : Pia et al. stated the high operative mortality as 40%[4] and Handa et al as more than 70%[5]. Especially, in the case of multiple aneurysms associated with tumor, the prognosis as well as mortality have been reported to be more dismal. Therefore, various factors should be considered in deciding treatment. The location of the tumor and each aneurysm, the grade of adhesion between tumors and aneurysm, radiological mass findings, and aneurysm size and characteristics should be considered as important factors.

According to Ogino et al., aneurysmal clipping should be performed firstly through a careful, stepwise procedure in order to decrease the risk of rupture, and then both tumors and aneurysms should be removed at the same time[5]. Before surgical removal of the tumor, the authors performed GDC coiling, which was recently attempted for treatment of aneurysm. In cases of treatment for aneurysm using the GDC procedure mortality from intra-operative aneurysmal rupture or delayed rebleeding was reported to be 7.8%[10].

In the case of patients with tumor and aneurysm, it would be better to treat simultaneously both the tumor and aneurysm in order to decrease the risk of delayed hemorrhage after tumor removal[3,10]. Our therapeutic strategy for those specific patients was embolization of embedded aneurysm firstly using GDC and open surgery for tumor resection secondly. With this steps total removal of tumor mass can be carried out safely.

Conclusion

The surgical treatment of brain tumor associated with adjacent aneurysm has some difficulties because of higher rate of the fatal intra-operative aneurysmal rupture. The author could obtain successful therapeutic result for a patient with tuberculum sellae meningioma combining mirror image paraclinoid aneurysms using endovascular technique followed by open surgery. Total resection of the tumor could carried out safely after coiling of the larger aneurysm which was almost encased by tumor mass.

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