Journal of Clinical Neuroscience 45 (2017) 236–242

Contents lists available at ScienceDirect

Journal of Clinical Neuroscience

journal homepage: www.elsevier.com/locate/jocn

Case study

Strategy for patients with co-existence of meningioma and intracerebral aneurysm, especially unruptured aneurysm (–seven cases and review of the literature–)

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ARTICLE INFO

Article history:
Received 15 April 2017
Accepted 21 July 2017

Keywords:
Coexistence
Meningioma
Intracerebral aneurysm
Strategy

ABSTRACT

Background: Intracerebral aneurysms co-existing with meningiomas are rare. Treatment strategies for intracerebral aneurysms co-existing with meningiomas have not yet been established.
Methods: We studied 62 patients with intracerebral aneurysms co-existing with meningiomas in the literature including our seven cases, evaluated the various managements and outcomes, and discussed the strategy for intracerebral aneurysms, especially unruptured cases, co-existing with meningiomas. The aim of this study was to develop a guide for the management of non-subarachnoid hemorrhage (SAH) intracerebral aneurysms co-existing with meningiomas.
Results: Most intracerebral aneurysms co-existing with meningiomas are unruptured. Of course, aneurysms presenting with SAH should be treated first followed by the resection of meningiomas. In addition, intracerebral aneurysms inside or adjacent to meningiomas have a high risk of intraoperative rupture during the surgery for meningiomas, and it may be necessary to treat them first followed by the resection of meningiomas with one or two-step surgery.
In nine out of 62 patients, ten intracerebral unruptured aneurysms were not treated; however, no intracerebral aneurysms ruptured during the follow-up period, and outcomes of these patients were good in eight and poor in only one.
Conclusions: Intracerebral unruptured aneurysms remote from meningiomas may be treated according to the guidelines for unruptured aneurysms.
In advance of microsurgery and endovascular techniques, both lesions should be treated, if possible.

1. Introduction

The co-existence of brain tumors and intracerebral aneurysms is very rare. Most of such brain tumors include meningiomas, pituitary adenomas, and gliomas. We studied the characteristics of intracerebral aneurysms co-existing with meningiomas in the literature including our seven cases.

The aim of this study was to develop a guide for the management of non-subarachnoid hemorrhage (SAH) intracerebral aneurysms co-existing with meningiomas.

2. Materials and methods

Between August 1995 and August 2016 in Nishi-Kobe Medical Center, 156 patients were diagnosed with meningiomas by MRI. Of these, 146 underwent surgery and all of their brain tumors were diagnosed pathologically as meningiomas. Intracerebral aneurysms co-existed in seven patients (4.79%).

In a review of the literature published in that same period, there were 55 patients with the co-existence of intracerebral aneurysms and meningiomas. In a total of 62 cases, we studied the locations of the intracerebral aneurysms, whether presenting symptoms were due to meningiomas or aneurysms, treatment modalities for

Abbreviations: SAH, subarachnoid hemorrhage; 3DCTA, three-dimensional computed tomographic angiography; MRA, MR angiography; ICA, internal carotid artery; MCA, middle cerebral artery; ACA, anterior cerebral artery; Acom, anterior communicating artery; MMA, middle meningeal artery; VA-PICA, vertebral artery-posterior inferior cerebellar artery; IC-PC, internal carotid artery-posterior communicating artery; IC-Ach, internal carotid artery-anterior choroidal artery; PCA, posterior cerebral artery.

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http://dx.doi.org/10.1016/j.jocn.2017.07.032
0967-5868/

aneurysms (endovascular or clipping), whether only one lesion or both were treated, and outcomes of untreated intracerebral aneurysms without an episode of SAH.

3. Results

Case 1: A 58-year-old female was made diagnosed with a right internal carotid artery-posterior communicating artery (ICPC) aneurysm on MRI at another hospital five years ago. She visited our center with concern about the rupture or growth of the aneurysm. MRI revealed a right ICPC aneurysm (maximum length: 3.9 mm) without enlargement since the first diagnosis and, in addition, an iso-intensity mass on a T1-weighted image and a high-intensity mass on a T2-weighted image with homogenous enhancement after Gd-DTPA infusion at the right parietal convexity. Total resection of the tumor (Simpson grade I) was performed. Surgical specimens were diagnosed pathologically as meningothelial meningioma (WHO grade I). Five years after the surgery, MRI showed no recurrence of the tumor and no change of the aneurysm.

Case 2: A 75-year-old female, complaining of visual impairment of left eye, underwent surgery for cataract two years before admission. However, her left visual acuity worsened gradually and, on admission, it had deteriorated to finger-perception associated with bitemporal hemianopsia. MRI revealed a parasellar tumor (Fig. 1, upper left) and MRA and 3 dimensional computed tomography angiography (3DCTA) showed a small left ICPC aneurysm (Fig. 1, upper right), but conventional cerebral angiography for detecting the feeding arteries of the tumor showed a left ICPC aneurysm (2.5 mm) (Fig. 1, lower right). A left frontotemporal craniotomy was conducted.

Both the left ICA and aneurysm were encased with the tumor but it was not difficult to dissect between them followed by resection of the tumor. The aneurysm neck was clipped completely after total removal of the tumor (Fig. 1, lower left). Her visual acuity improved postoperatively.

Case 3: A 63-year-old female was admitted to our center because of seizure involving the right lower extremity and gait disturbance due to right hemiparesis (MMT 4/5). MRI revealed a left parasagittal tumor of 3 cm in diameter in the precentral region (Fig. 2, A). Preoperative angiography showed the stained tumor fed by the bilateral middle meningeal arteries (MMA) and stenosis of the superior sagittal sinus caused by compression of the tumor and bilateral middle cerebral artery bifurcation (MCA) aneurysms (right: 2.6 mm left: 2.8 mm) (Fig. 2, C). Subtotal resection (Simpson grade III) (Fig. 2, B) except for invasion to the superior sagittal sinus was performed after embolization of the MMA preoperatively. The postoperative course was uneventful and her symptoms disappeared immediately. At both four (Fig. 2, D) and six years (Fig. 2, E) after surgery, the untreated aneurysms remained unchanged.

Case 4: A 58-year-old female was admitted to our center because of a decrease of the left-sided visual acuity and left lower quadrant anopsia. MRI revealed iso-intensity on a T1-weighed image and high-intensity on a T2-weighed image with homogenous enhancement in the left clinoidal region (Fig. 3, upper left). Cerebral angiography showed a stained tumor fed by the left ICA and MMA, and a left ICA (carotid cave) aneurysm (10.6 mm) (Fig. 3, upper right). Endovascular embolization of the aneurysm

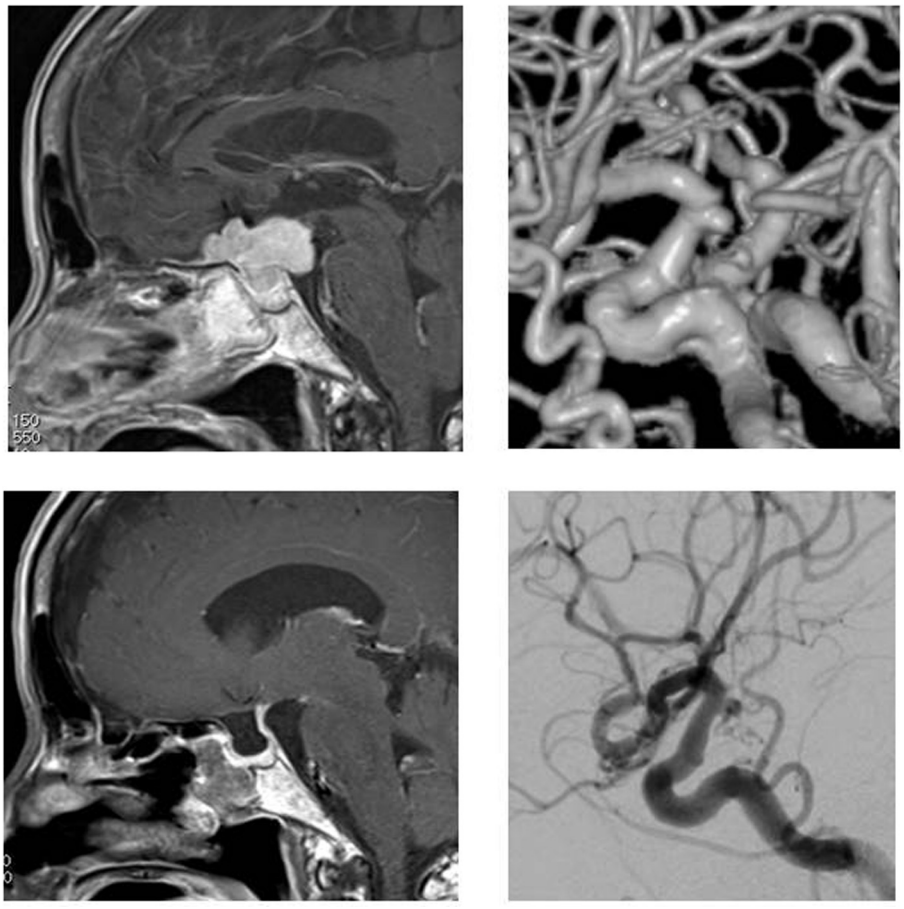

Fig. 1. Preoperative MRI shows a left tuberculum sellae tumor with marked enhancement after Gd infusion (upper left), and postoperative MRI shows the complete resection of the meningioma (lower left) and 3DCTA (upper right) and conventional cerebral angiography (lower right) show a small left ICPC aneurysm.