

Case Report

Unruptured medial paraclinoid internal carotid artery aneurysm embedded within symptomatic nonfunctioning pituitary giant adenoma: A high-risk comorbid pathology in transsphenoidal surgery and its countermeasures



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ABSTRACT

Background: Injury of the internal carotid artery (ICA) in the cavernous portion is one of the most critical complications of transsphenoidal surgery (TSS), especially in cases of coexistence with a pituitary adenoma (PA) and ICA aneurysm.

Case description: We present a rare case of unruptured medial paraclinoid ICA aneurysm (ICA-An) associated with symptomatic nonfunctioning giant PA. After endovascular coil embolization of the unruptured 4-mm saccular medial paraclinoid ICA-An, the patient underwent adenectomy through an endoscopic endonasal TSS. During the bone resection over the right sellar floor near the right cavernous sinus, a tangle of packed coils in the treated medial paraclinoid ICA-An was observed immediately after a bite of a Kerrison rongeur. The dural layer over the coiled aneurysm had become thin to the point of transparency or complete absence. Careful inspection revealed that the bone hillock was formed by the medial paraclinoid ICA-An. Gross total resection of the adenoma was achieved without vascular injuries related to the coiled aneurysm despite postoperative transient right oculomotor paresis.

Conclusions: This case conveys three important lessons about TSS: 1) coil embolization will manage a medial paraclinoid ICA-An as a sufficient preoperative procedure for TSS; 2) a medial paraclinoid ICA-An can appear directly under the sellar floor as an apparent extradural aneurysm; and; 3) surgeons should take great care in procedures near a coil-embolized medial paraclinoid ICA-An because the aneurysmal wall can be thin to the point of transparency.

1. Introduction

Pituitary adenoma (PA) with coexisting intracranial aneurysm is not uncommon [1–3]. Coexistence between an intracranial aneurysm and a pituitary adenoma has been well documented [4–10]. This association has been reported to range from 3.7% to 7.4%. Co-incidental aneurysms are reported almost seven times more frequently in patients with pituitary adenomas than in patients with other types of brain tumors [3]. However, the great majority of these aneurysms are located outside the tumor itself [11]. The presence of an internal carotid artery (ICA) aneurysm embedded within a pituitary adenoma (PA) located inside the sella turcica has rarely been reported and has been examined in only

two case reports [10,12] in the era of endoscopic endonasal transsphenoidal surgery (EETSS).

We present a case of unruptured medial paraclinoid internal carotid artery (ICA) aneurysm embedded within a symptomatic nonfunctioning pituitary giant adenoma as a high-risk comorbid pathology in EETSS. It was located immediately beneath the sellar floor almost without dural covering under the EETSS vision. After endovascular coil embolization, the giant adenoma was gross-totally resected without vascular injuries related to the coiled ICA aneurysm (ICA-An) despite postoperative right oculomotor paresis. During bone resection of the sellar floor, a certain small bite made by an up-biting Kerrison rongeur revealed a tangle of packed coils, which was seen through the transparent aneurysmal wall.

Abbreviations: An, aneurysm; CVA, best-corrected visual acuity; CT, computed tomography; EETSS, endoscopic endonasal transsphenoidal surgery; ICA, internal carotid artery; PA, pituitary adenoma; TSS, transsphenoidal surgery

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Catastrophic bleeding would have occurred at the bone resection over the extradural aneurysm, if the ICA-An had been overlooked and had not been treated before EETSS. We describe the clinical management of a pituitary giant adenoma and embedded ICA-An within it and discuss the countermeasures to avoid critical vascular complications.

2. Case report

2.1. Case presentation

A 73-year-old hypertensive woman with a history of breast cancer in remission developed progressive visual disturbance over a 6-month period prior to admission. A neurological examination revealed that her right eye's visual acuity of "hand motion" (while the patient could recognize a hand being waved, she could not count the fingers on the hand), her right pupil's sluggish light reflex, and right-dominant bitemporal hemianopsia based on a confrontation test. An ophthalmological examination confirmed the BTHA and showed that her decimal best-corrected visual acuity (BCVA) was 0.03 ($< 20/600$) in the right and 0.4 (20/50) in the left eye. An endocrinological work-up showed the adenoma as nonfunctioning. Magnetic resonance (MR) imaging demonstrated a large pituitary tumor displacing the optic chiasm superiorly and its internal fluid level indicating past hemorrhagic events (Fig. 1A–C). We determined that EETSS was indicated in this case. Preoperative three-dimension computed tomographic angiography demonstrated a right medial paraclinoid ICA saccular aneurysm embedded within the pituitary adenoma (Fig. 2A). The longest diameter of the aneurysm was 4.0 mm (Fig. 2B).

2.2. Surgical procedures

To prevent intraoperative rupture of the aneurysm, we performed coil embolization without adjunctive techniques prior to EETSS. The aneurysm was coiled with a MICRUSPHERE® Framing Coil (Micrus Endovascular, San Jose, CA, USA) (3 mm \times 4 cm) as the first coil, and was filled and finished with Target® Nano™ Detachable Coils (Stryker-Neurovascular, Kalamazoo, MI, USA) (2 mm \times 4 cm, 2 mm \times 3 cm, and 1.5 mm \times 2 cm, in this order). The volume embolization rate was 28.8% (Fig. 2C). Angiography just after embolization showed a slight neck remnant (Fig. 2D). Mild systemic heparinization was continued

until 6 h before the EETSS. The patient's postembolization clinical course was uneventful. On the fifth day of post-embolization, the patient underwent an EETSS for adenomectomy and optic pathway decompression. During the bone resection over the right sellar floor near the right cavernous sinus, a tangle of packed coils in the treated ICA aneurysm was observed immediately after a certain small bite of a Kerrison rongeur (Fig. 2E). The dural layer over the coiled aneurysm had complete absence or was very thin and transparent (Fig. 2F). No blood flow among the tangled coils was observed through the transparent aneurysmal wall (Fig. 2F). Careful inspection revealed a bone hillock formed by the ICA aneurysm. Careful procedures were required during this adenomectomy after visual recognition of the coil tangle, so that the packed coils were not pushed out into the lumen of the ICA. Gross total resection of the adenoma was achieved without vascular injuries related to the aneurysm despite postoperative right oculomotor paresis.

2.3. Outcome and follow-up

A postoperative MR imaging showed gross total resection of the adenoma without hemorrhagic complications (Fig. 1D–F). Her BTHA recovered to nearly normal range. She left the hospital without sequelae except for the right oculomotor paresis. The right oculomotor paresis improved gradually over eight months. Her decimal BCVA was 0.7 ($> 20/30$) in the right eye and 1.0 (20/20) in the left eye at the eight months after the EETSS.

3. Discussion

Even with careful extradural manipulations, a rupture of the ICA aneurysm and related ICA injury could have occurred during bone resection of the sella turcica if the medial paraclinoid ICA aneurysm had been overlooked and had not been treated preoperatively in this present case.

The dural layer over the coiled aneurysm had almost complete absence. No blood flow among the tangled coils was observed through the transparent aneurysmal wall. In this case, we needed to take great care not to push out the tangle of coils into the ICA lumen during this adenomectomy. We resected the adenoma gross-totally without vascular injuries related to the aneurysm despite postoperative right

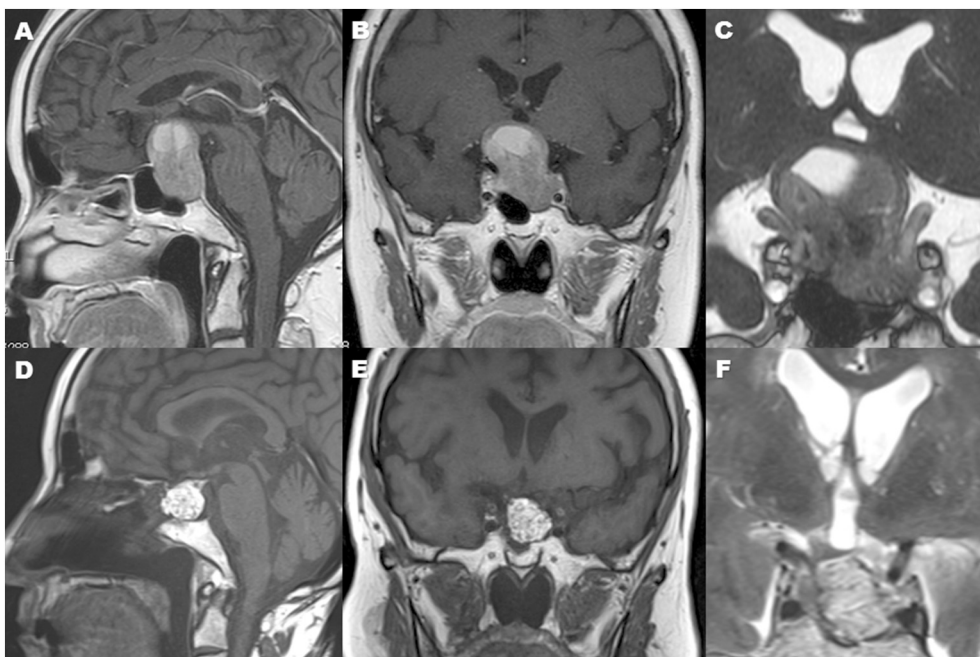


Fig. 1. A: a preoperative mid-sagittal section of gadolinium-enhanced T1-weighted MR imaging shows a pituitary macroadenoma with suprasellar extension. B: a preoperative coronal section of gadolinium-enhanced T1-weighted MR imaging shows the macroadenoma partially involving the intradural segment of the right internal carotid artery. C: a coronal section of T2-weighted MR image demonstrates the markedly compressed optic chiasm by the macroadenoma. D: a postoperative sagittal section of precontrast T1-weighted MR image shows gross total resection of the macroadenoma and intrasellar inserted adipose tissue. E: intrasellar placement of the adipose tissue prevents empty sella after adenomectomy. F: optic pathway decompression is achieved.

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