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Case Report

Treatment of an anterior cerebral artery pseudoaneurysm secondary to a transsphenoidal surgery using stent-assisted coiling

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ABSTRACT

Background: Injury of the internal carotid artery (ICA) during transsphenoidal surgery (TSS) is a rare but critical complication. There are several reports on endovascular treatment of ICA injury during TSS. With the recent flourishing of extended TSS, injuries to the distal arteries such as the anterior cerebral artery (ACA) are more likely to occur.

Case Description: In the present case, we report a pseudoaneurysm of the right ACA due to injury during extended TSS for aggressive prolactinoma. Due to the absence of collateral vessels, the pseudoaneurysm had to be obliterated while preserving the parent artery. Hence, we decided to treat the pseudoaneurysm using stent-assisted coiling (SAC). The pseudoaneurysm was completely obliterated and he was discharged without any complications.

Conclusion: To the best of our knowledge, this is the first case in which an ACA pseudoaneurysm caused by injury during the TSS was treated with SAC and the parent artery was preserved.

Keywords: Anterior cerebral artery, Parent artery preservation, Pseudoaneurysm, Stent-assisted coiling, Transsphenoidal surgery

INTRODUCTION

Injuries of the cerebral arteries are the most severe and critical complications of the transsphenoidal surgery (TSS).[6] The internal carotid artery (ICA) is most likely to be damaged as it is usually exposed during TSS.[6] Due to the recent advancements in technologies, the number of extended TSSs has increased.[6] In extended TSS, apart from the ICA, the other cerebral arteries such as the anterior cerebral artery (ACA) and posterior cerebral artery (PCA) are also widely exposed.[6] We observed a pseudoaneurysm of the ACA due to injury during extended TSS. Without a definitive treatment, pseudoaneurysms are associated with a high rupture rate.[2] Therefore, a fatal subarachnoid hemorrhage was a concern in this case. Preservation of the parent artery was mandatory in this case as there was no collateral flow. However, to the best of our knowledge, there are no reports on the treatment of ACA pseudoaneurysms secondary to TSS where the parental artery is preserved.

CASE REPORT

A 53-year-old man with aggressive dopamine-resistant prolactinoma had undergone TSS in another hospital a year ago. Most of the tumor was left untouched due to the close proximity of the ICAs and an insufficient operative field [Figure 1a]. The tumor continued to proliferate and the serum prolactin levels increased to 11,000 ng/mL; it was resistant to high doses of cabergoline (up to 9 mg/week). Therefore, the patient was admitted to our hospital for a second surgery.

Due to the extent of the tumor, the patient underwent an extended TSS. Tumors of the suprasellar area were firmly adhered to the surroundings, and an unexpected arterial bleeding occurred during debulking of the area [Figure 1b]. Hemostasis was achieved by meticulous compression using Gelfoam. Postoperative computed tomography angiography revealed a flow reduction of the right ACA [Figure 1c] and infarction of its perfusion area [Figure 1d]. Fortunately, the patient was asymptomatic postoperatively. A sequential magnetic resonance angiography (MRA) images showed dynamic changes in the lesion [Figure 1e-h] and it finally converted to a pseudoaneurysm [Figure 1g and h].

A treatment intervention was necessary in this case as pseudoaneurysms are associated with a high rupture rate and significant mortality.[2] Unfortunately, according to the previous angiography, cross-flow from the left ACA was not expected; therefore, occlusion of the artery was not possible. After 1 month, the pseudoaneurysm had not healed naturally even with meticulous control of the blood pressure.

Hence, we decided to treat the pseudoaneurysm using stent-assisted coiling (SAC). Preoperatively, the patient was administered 300 mg clopidogrel and 300 mg aspirin orally. Under local anesthesia, an 8-French sheath was placed in the left femoral artery. An initial bolus dose of 50 IU/kg heparin was administered intravenously. Three-dimensional rotational angiography from an 8-French balloon-guiding catheter (Optimo, Tokai Medical Products, Aichi, Japan) confirmed a small pseudoaneurysm [Figure 2a]. The Excelsior SL-10® Microcatheter (Stryker, Fremont, CA, USA) was introduced through the guiding catheter and carefully inserted in the pseudoaneurysm. Two coils (Target® Nano™ Detachable Coil; Stryker, Fremont, CA, USA) were used to sufficiently obliterate it [Figure 2b]. The same microcatheter was then used to deliver a 3 × 15 mm Neuroform Atlas® Stent System (Stryker, Fremont, CA, USA) [Figure 2c]. His systemic blood pressure was meticulously controlled at approximately 100 mmHg, and he was aggressively hydrated throughout the procedure. The pseudoaneurysm was successfully obliterated without any bleeding or clot formation within the stent. The postoperative course was uneventful, and an angiography 2 weeks postoperatively demonstrated a complete obliteration of the pseudoaneurysm [Figure 2d].

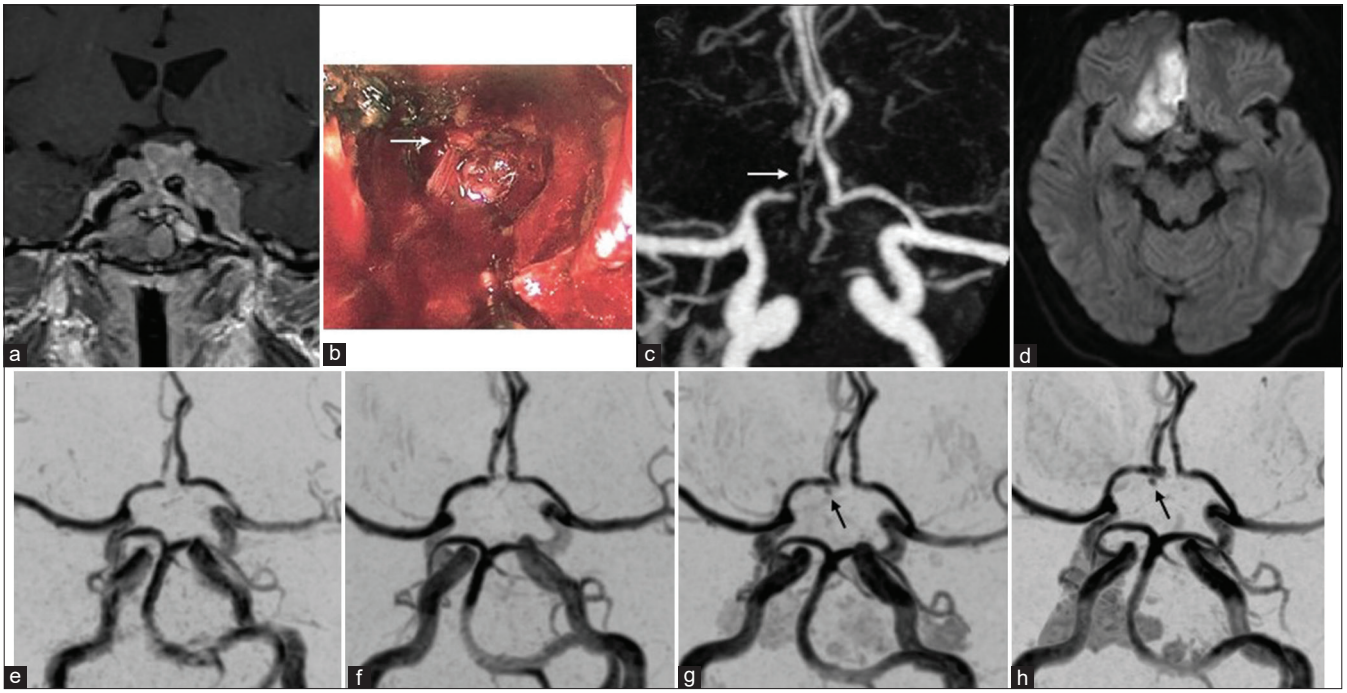

Figure 1: (a) Preoperative magnetic resonance (MR) imaging shows a large sellar tumor with upward and bilateral extensions. (b) Endoscopic view shows arterial bleeding from the injured vessel (arrow). (c) Postoperative computed tomography angiography shows flow impairment around the lesion. (d) Diffusion- weighted imaging shows infarction of its perfusion area. MR angiography on day 1 (e), day 3 (f), day 7 (g), and 1 month later (h) shows dramatic changes in the lesion. Arrow indicates pseudoaneurysm.

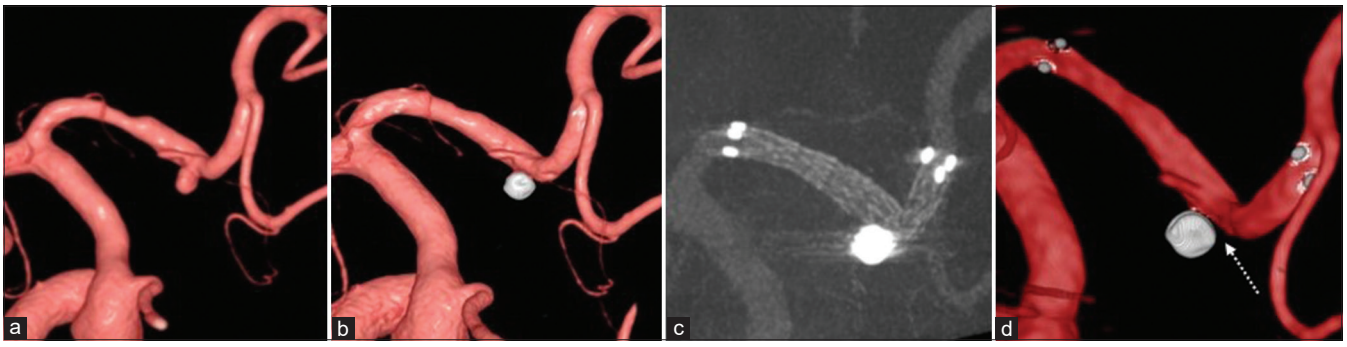

Figure 2: (a) Preoperative three-dimensional rotational angiography (3DRA) shows the pseudoaneurysm. Postoperative 3DRA shows the pseudoaneurysm obliterated with coils (b), and a complete stent apposition (c). (d) 3DRA after 2 weeks shows a gap between the coils and the vessel (arrow).

DISCUSSION

Perforation and laceration of the ICA are the most common types of injuries during a TSS that results in a pseudoaneurysm formation.[3] A pseudoaneurysm is associated with a high rupture rate without a definitive treatment and can result in significant morbidity and mortality.[2] Parental artery occlusions are the definitive treatment for pseudoaneurysms.[2] Recently, a flow diverter (FD) is predominantly being used to obliterate the pseudoaneurysm of the ICA after TSS when occlusion of the parent artery is not an option due to poor collateral supply.[3] In this case, due to an absent collateral flow from the other side, preservation of the parent artery was mandatory. After a thorough search of the literature, we found that only two cases of the ACA pseudoaneurysm caused by injury during TSS have been reported,[1,6] the parent arteries were sacrificed in both the cases.[1,6] Since FD is not currently available for the ACA, SAC is the only alternative. SAC was used in two reports for pseudoaneurysms of superior cerebellar artery[1] and PCA[5] injured during TSS. Together with our case, we may conclude that SAC could be the best treatment option for such complications. In the near future, FD should be made available for pseudoaneurysms of cerebral arteries other than the ICA. As reported previously,[4] spontaneous healing was another option and was expected in our case too. However, despite a careful observation by frequent MRAs for a month, spontaneous healing was not seen. The interval between the onset of the pseudoaneurysm and the treatment may have stabilized the lesion, which contributed to the successful outcome. Nevertheless, it could be done earlier to avoid the risk of rupture.

CONCLUSION

This is the first case in which an ACA pseudoaneurysm caused by injury during the TSS was treated with SAC and the parent artery was preserved. SAC could be the best treatment option for this kind of fatal complication in TSS until FD is available for ACA.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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