

Euro Surgery 2020: Rupture from Cavernous Internal Carotid Artery Pseudoaneurysm 11 Years After Transsphenoidal Surgery

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Background: Bioabsorbable plates are frequently utilized in the repair of skull base defects following transsphenoidal operations. Traumatic intracranial pseudoaneurysms are a rare complication of transsphenoidal surgery. To date, iatrogenic carotid pseudoaneurysm associated with the use of an absorbable plate has been reported once.

Results A 57-year-old man with a large nonfunctional pituitary macroadenoma underwent an endoscopic transsphenoidal operation with gross total resection. An absorbable plate was placed extradurally to reconstruct the sellar floor. He experienced delayed repeated epistaxis, followed by a right middle cerebral artery distribution embolic stroke. Computed tomography (CT) angiogram 6 weeks postoperatively revealed a 6 × 4 mm pseudoaneurysm located on the medial wall of the right cavernous internal carotid artery. Stent coiling was used to successfully obliterate the pseudoaneurysm, and the patient fully recovered.

Conclusion Delayed erosion of the carotid artery wall caused by a plate used to reconstruct the sellar floor may manifest with epistaxis or embolic stroke. The authors' preference is to avoid insertion of a rigid plate for sellar floor reconstruction in the absence of intraoperative cerebrospinal fluid (CSF) leaks, unless it is required to buttress a large skull base defect. Short-segment embolization with stent coiling is the preferred treatment option for carotid pseudoaneurysms following transsphenoidal operations.

Keywords: cavernous, carotid, pseudoaneurysm, artery

Introduction: The transsphenoidal approach is the most commonly utilized operation for the surgical treatment of sellar lesions and is a relatively safe operation in experienced centers.¹ Following resection

of pituitary adenomas and other sellar tumors, many surgeons utilize absorbable plates to reconstruct the bony sellar floor to serve as a buttress for the sellar contents and repair construct. Although usually safe, vascular injury in conjunction with insertion of rigid plates following sellar tumor resection has been described once before.²

Common complications of transsphenoidal operations include endocrine abnormalities and cerebrospinal fluid (CSF) leaks.³ Vascular injury is a rare but serious complication of transsphenoidal surgery encountered in 0.8 to 1.1% of cases, with an associated mortality of nearly 30%.^{4,5,6} The majority of vascular injuries are identified at the time of surgery, usually resulting from direct injury to the internal carotid artery during resection of tumor within the cavernous sinus or upon opening of the dura, often resulting in profuse arterial hemorrhage.^{6,7,8,9} Other described vascular complications include vasospasm, carotid thrombosis, cavernous sinus thrombosis, embolism, caroticocavernous fistula, or pseudoaneurysm.^{2,3,7,8,10,11,12,13,14,15,16,17,18,19}

Postoperative carotid pseudoaneurysm, though rare, represents a grave risk to the patient if unrecognized. It may lead to delayed hemorrhagic or embolic complications when the patient is no longer in a monitored hospital setting. This case report highlights the importance of rapid diagnosis and treatment of these lesions. We present a rare case of delayed pseudoaneurysm and embolic stroke following erosion of a rigid plate into the cavernous internal carotid artery.

Case Report: A 57-year-old man with a nonfunctional pituitary macroadenoma causing vision loss underwent a gross total, endoscopic transsphenoidal resection (Fig. 1). The tumor was invading the right cavernous sinus wall. During the procedure to resect

the tumor from this region, there was some venous bleeding that was easily controlled by temporarily packing the area using Gelfoam (Pfizer, New York, New York, USA) with thrombin. Following resection, a custom-fit bioabsorbable plate was placed extradurally to reconstruct the sellar floor. The patient was discharged home on postoperative day 2 in excellent condition. Four weeks later, he experienced epistaxis for which he was treated at an outside emergency department. The bleeding was controlled with nasal packs, and the patient was discharged home. Six weeks following the operation, he presented to clinic with dysarthria as well as left hand and facial weakness and was admitted for further work-up. Neuroimaging revealed subacute infarcts in right middle cerebral artery distribution. Computed tomography (CT) angiogram showed a 6 × 4 mm pseudoaneurysm located on the medial wall of the right cavernous internal carotid artery. A hypodensity likely representing the implanted absorbable plate was noted to be compressing the right carotid artery in this region (Fig. 2). Stent coiling with placement of eight detachable coils was used to successfully obliterate the pseudoaneurysm (Fig. 3). Follow-up digital subtraction angiogram and CT angiogram demonstrated durable obliteration of the pseudoaneurysm with preserved flow through the carotid artery. On follow-up, the patient's neurological deficits have resolved. Iatrogenic carotid pseudoaneurysm is an extremely rare complication of transsphenoidal surgery, with only 24 reported cases found in our review of the literature. Only one previous case was associated with sellar floor reconstruction.² A pseudoaneurysm is caused by injury to the carotid artery wall leading to an encapsulated hematoma in communication with the ruptured artery. In general, an aneurysmal rupture of the cavernous carotid will result in a caroticoavernous fistula. However, severe epistaxis and pituitary apoplexy have been reported in patients whose medial cavernous sinus wall has been eroded by tumor or violated during surgery.⁴ Thus, the

consequences of aneurysmal rupture support urgent treatment of even incidentally diagnosed lesions, as they represent a grave risk to the postoperative patient. Because of the extremely low reported incidence of pseudoaneurysms after transsphenoidal surgery, postoperative angiography is not routinely performed.⁶ Although in cases where there is significant arterial bleeding or concern for carotid injury, many experts recommend immediate postoperative angiography.^{6,15}

Based on the uneventful operative course and features observed on CT angiogram, the pseudoaneurysm was likely caused by erosion of the absorbable plate into the cavernous carotid artery. This has been previously reported by Crowley et al and was also associated with delayed severe epistaxis followed by transient ischemic deficits.² Despite its low complication rates, these cases highlight the risks associated with sellar floor reconstruction.²⁰ Both patients were treated via endovascular means with good results. In a majority of cases, the absorbable plates used to reconstruct the bony sellar floor can be custom fit to approximate the size of the defect. The surgeon must take extra care to ensure that the cut edges are as round and smooth as possible, and that the size of the plate is just large enough to be inserted beneath the bony edges of the lateral sellar floor, and in an extradural fashion. Perhaps more importantly, the authors now make every attempt to only use a rigid buttress when necessary—that is, only in cases where intraoperative CSF leaks are observed in the setting of a large bony defect that cannot be repaired or adequately buttressed with routine techniques, including cellulose sponge, Duragen (Integra Life-Sciences Corporation, Plainsboro, New Jersey, USA), and fibrin glue.

Biography: Dr Morrison completed his Doctor of Medicine at the University of New South Wales in 2017. He is currently a neurosurgery registrar at Royal Prince Alfred Hospital in Sydney. In 2019 he was awarded NSW Junior Medical Officer of the Year.