



## Case Report

# Cerebral vasospasm occurring immediately after endoscopic transsphenoidal resection of a pituitary adenoma: A case report

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## ABSTRACT

**Background:** Cerebral vasospasm is a rare postoperative complication of transsphenoidal pituitary adenoma surgery with potentially severe consequences. These vasospasms generally have a delayed presentation at a mean of 8 postoperative days. We report an unusual case of hyperacute onset of cerebral vasospasm that occurred immediately after surgery.

**Case Description:** A 38-year-old man underwent endoscopic transsphenoidal surgery for a nonfunctioning pituitary adenoma. The patient experienced mild subarachnoid hematoma during surgery. Three hours after surgery, he developed rightward conjugate eye deviation and complete paralysis of the left upper and lower extremities. Diagnostic imaging revealed cerebral vasospasm in both middle cerebral arteries, and symptoms improved after intra-arterial administration of fasudil hydrochloride.

**Conclusion:** There is a need for prompt diagnosis and therapeutic intervention when typical symptoms of cerebral vasospasm, such as paralysis, occur at any time during the postoperative course.

**Keywords:** Pituitary adenoma, Transsphenoidal surgery, Vasospasm

## INTRODUCTION

Cerebral vasospasm is a rare postoperative complication of transsphenoidal pituitary adenoma surgery with potentially severe consequences and can present as neurological deterioration such as hemiparesis, impaired consciousness, and cranial nerve neuropathy.<sup>[1,3]</sup> As cerebral vasospasm occurs at a mean of 8 days after surgery, it is generally regarded as a delayed complication.<sup>[3]</sup> Herein, we describe an unusual case of hyperacute onset of cerebral vasospasm that occurred immediately after surgery.

## CASE PRESENTATION

A 38-year-old Japanese man (height: 168 cm; weight: 76.2 kg) with a history of hypertension presented to Kansai Medical University Hospital with the chief complaint of bitemporal

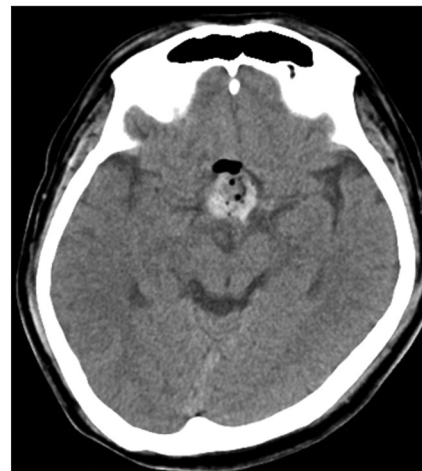
hemianopsia. Magnetic resonance imaging (MRI) revealed a large 3.8-cm mass in the sella turcica. The patient was diagnosed with a nonfunctioning pituitary adenoma, and endoscopic transsphenoidal resection was scheduled. Surgery was performed under general anesthesia, which was induced and maintained with total intravenous anesthesia. Although irregular surgical procedures and surgical maneuvers for hypothalamus, intraoperative complications included mild cerebrospinal fluid leak and slight bleeding from the tumor dripped into the arachnoid and resulting in mild subarachnoid hematoma. After surgery, the patient was extubated in the operating room. The patient exhibited a relatively low level of consciousness during emergence from anesthesia. Total anesthesia time was 5 h 9 min, operative time was 3 h 33 min, and intraoperative blood loss was 250 mL.

A computed tomography (CT) scan of the patient's head was performed after he left the operating room, which confirmed that a mild subarachnoid hematoma had occurred [Figure 1]. The patient was admitted to the intensive care unit, where he developed complete paralysis of the left upper and lower extremities as well as rightward conjugate eye deviation 3 hours later. His consciousness level was E1V3M5 according to the Glasgow coma scale (GCS). Although his conjugate eye deviation was directed opposite to the paralyzed side, 5 mg of diazepam was administered with consideration to the possibility of a convulsive seizure. Conjugate eye deviation was resolved after diazepam administration. No association between blood test results and impaired consciousness was found. Another head CT scan was performed, but did not indicate any significant changes from the scan taken immediately after surgery. To rule out the possibility of cerebral infarction, an MRI scan of the brain was performed. The MRI revealed extensive infarction at the right middle cerebral artery territory [Figure 2a], and magnetic resonance angiography showed poor visualization of both middle cerebral arteries [Figure 2b]. The symptoms were determined to be due to cerebral ischemia.

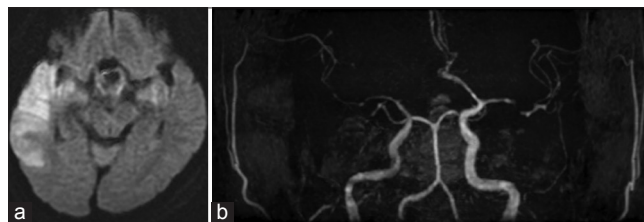
Emergency angiography was performed, which confirmed vasospasm in the M1-M2 segments of the right middle cerebral artery territory and the M1 segment of the left middle cerebral artery territory [Figure 3]. Intra-arterial administration of fasudil hydrochloride to these sites improved cerebral vasospasm and paralysis [Figure 4]. After the patient showed improvement in consciousness level (GCS: E4V4M6) and other neurological impairments, he was returned to the intensive care unit. After that, the patient experienced no further neurological deterioration and was discharged 17 days after surgery with good progress.

## DISCUSSION

Postoperative complications of transsphenoidal pituitary adenoma surgery include infection, epistaxis, sinonasal



**Figure 1:** Computed tomography scan of the head taken immediately after surgery showing mild subarachnoid hemorrhage around the tumor excision site.



**Figure 2:** (a) Magnetic resonance imaging indicating extensive infarction at the right middle cerebral artery territory. (b) Magnetic resonance angiography shows poor visualization of both middle cerebral arteries.



**Figure 3:** Emergency cerebral angiogram showing vasospasm in both middle cerebral arteries.

complications, cerebrospinal fluid leak, electrolyte imbalance, hormonal disturbance, and vascular injuries.<sup>[1]</sup> In addition, cerebral vasospasm is a rare delayed complication that can lead to delayed cerebral ischemia or poor neurological outcomes if not promptly diagnosed and treated.<sup>[1,3,4]</sup> Cerebral



**Figure 4:** Cerebral angiogram after intra-arterial administration of fasudil hydrochloride. Vasospasm and paralysis improved after administration.

vasospasms are reported to occur at a mean of 8 days after surgery and continue for a mean of 14 days.<sup>[1]</sup> Common presentations include hemiparesis, aphasia, cognitive dysfunction, and seizures.<sup>[1,4]</sup>

Several pathogenic mechanisms for cerebral vasospasms have been proposed, such as direct vascular injury and damage to the arachnoid layer leading to the leakage of blood into the subarachnoid layer, cerebrospinal fluid rhinorrhea, and meningitis.<sup>[1,2,5]</sup> However, a clear mechanism has yet to be established. Popugaev *et al.* reported on two cases of cerebral vasospasm that presented with meningitis within a month after transsphenoidal pituitary adenoma surgery.<sup>[5]</sup> In both patients, cerebral vasospasm only improved after the treatment of meningitis. In contrast to previous cases, our patient began experiencing neurological symptoms during the hyperacute postoperative phase (approximately 3 h after surgery), and not at a delayed stage. The lack of any electrolyte imbalance or dehydration during the postoperative course suggests that a sudden major arterial spasm had occurred due to intraoperative bleeding that spread into the subarachnoid space.

At present, there are no established general treatments for cerebral vasospasm after transsphenoidal pituitary adenoma surgery, and treatment strategies follow the same principles as the management of vasospasm following aneurysmal subarachnoid hemorrhage. These strategies include monitoring and controlling blood volume, ruling out infections and seizures, correcting electrolyte imbalance, and endovascular treatment.<sup>[1,4]</sup> Induced hypertension, euvolemia maintenance, and nimodipine administration are reported to be effective treatment options in patients

who have made complete neurologic recovery.<sup>[1-4]</sup> It has also been reported that appropriate transfusion management was used in the treatment of cerebral vasospasm with meningitis.<sup>[5]</sup> Our patient was treated using the same principles as the management of vasospasm in aneurysmal subarachnoid hemorrhage. However, fasudil hydrochloride was used as a vasodilator, which produced a favorable outcome comparable to that of nimodipine. Early diagnosis enabled the use of catheterization and for the patient to progress without new complications.

## CONCLUSION

This report described a rare case of cerebral vasospasm – a usually delayed complication – in the hyperacute phase 3 h after transsphenoidal pituitary adenoma surgery. Regardless of patient age, intraoperative subarachnoid hemorrhage followed by typical symptoms such as paralysis occurring at any time during the postoperative course requires prompt diagnosis and therapeutic intervention.

## Availability of data and materials

Not applicable.

## Ethical approval

The Institutional Review Board approval is not required.

## Declaration of patient consent

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

## Financial support and sponsorship

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## Conflicts of interest

There are no conflicts of interest.

## Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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