Abstract

Postoperative pituitary apoplexy is rare and usually occurs in the immediate postoperative period (within 12 hours) after subtotal resection of giant pituitary macroadenomas with fatal outcomes. We describe a unique case of postoperative pituitary apoplexy occurring in a delayed fashion on the third postoperative day. Early detection and emergent endoscopic transphenoidal exploration resulted in gross total removal of the residual tumor, decompression of the optic chiasm, and a favorable neurologic outcome. The authors review the literature of postoperative pituitary apoplexy and emphasize the importance of rapid diagnosis and intervention in order to achieve significant recovery and a favorable neurologic outcome.

Introduction

Pituitary apoplexy (PA) is a clinical syndrome characterized by an abrupt onset of symptoms associated with hemorrhage or infarction of a pre-existing pituitary adenoma. The syndrome usually occurs in patients with no previous history of a pituitary tumor and might represent the first indication that a pituitary tumor is present.1,3 Increased intrasellar pressure due to swelling and expansion of the lesion may cause compression of adjacent parasympathetic and sympathetic structures such as the cavernous sinus and optic chiasm, respectively. Patients with PA typically present with sudden onset of excruciating headache, nausea, vomiting, diplopia, ophthalmoplegia, and visual impairment.1,6 Failure to diagnose and treat PA in a timely fashion may result in permanent blindness and coma. Immediate corticosteroid administration followed by definitive treatment of PA is the treatment of choice in the majority of patients with PA, particularly if there is visual loss and neurologic deficits at the time of presentation.1,3,4

Postoperative pituitary apoplexy (PPA) following resection of a pituitary adenoma is rare and has been reported to occur in giant pituitary tumors (GPT) (greater than 4 cm in greatest diameter) after subtotal resection within the immediate postoperative period (within 12 hours).4 All of the previously reported cases demonstrated acute neurologic worsening with eventual fatal outcomes due to massive tumor swelling, intratumoral hemorrhage and infarction within the residual tumor. In this report, we describe a patient who presented with PPA after endoscopic transphenoidal removal of an invasive pituitary macroadenoma. Our case is unique in that: a) the volume of residual tumor was small, and therefore, not expected to be at risk of PPA, b) the apoplectic event occurred in a delayed fashion on the third postoperative day, and c) a favorable neurologic outcome was achieved.

Case Report

A 59-year-old man with history of prostate cancer and hypertension presented with progressive visual loss and bitemporal hemianopsia. Preoperative visual acuity revealed 20/80 in the right eye and 20/100 in the left eye. MRI of the pituitary gland demonstrated a large suprasellar pituitary macroadenoma (4.6 cm x 4.2 cm x 3.4 cm) compressing the optic chiasm (Fig. 1A and B, Fig. 2A). The tumor appeared invasive with extension laterally into both cavernous sinuses and erosion inferiorly through the sellar floor, into the sphenoid sinus and bony clivus. Preoperative pituitary function studies were consistent with a nonfunctioning pituitary adenoma.

The patient underwent endoscopic endonasal transphenoidal approach for removal of the pituitary macroadenoma. A bimanual endoscopic technique was performed using a 30-degree endoscope with stereotactic image-guidance. Intranasal and suprasellar resection of the tumor was carried out using 30-degree and 70-degree endoscopes. The suprasellar arachnoid descended into the sellar cavity and it was felt that an adequate decompression of the optic chiasm was achieved. A low-flow cerebrospinal fluid leak was identified and repaired with a fat graft and a vascularized pedicled nasoseptal flap.

Postoperatively, the patient was awake and following commands with full motor strength, intact cranial nerves, and significantly improved vision with full visual fields. Postoperative MRI and CT scans demonstrated excellent decompression of the optic nerves and chiasm with preservation of the stalk and normal pituitary gland (Fig. 1C and D, Fig. 2B). Residual tumor was noted in the left aspect of the sella with invasion into the left cavernous sinus. The patient was placed on subcutaneous heparin 5000 units twice a day for deep venous thrombosis prophylaxis starting 24 hours after surgery. On the third postoperative day, the patient experienced a sharp spike in systolic blood pressure to greater than 200 mm Hg. Intravenous antihypertensives were acutely administered. Shortly after the episode of hypertension, he began experiencing worsening bitemporal hemianopsia and bilateral decreased visual acuity. Emergent CT scan demonstrated an acute hemorrhage into the residual pituitary tumor expanding the suprasellar cistern consistent with a delayed hemorrhagic event (Fig. 1C). High dose intravenous corticosteroids were administered and the patient underwent emergent endoscopic transphenoidal exploration with evacuation of the suprasellar hematoma and further tumor removal.

Postoperatively, the patient experienced improved vision in visual acuity and fields. The remainder of his neurologic exam was unremarkable. Postoperative MRI and CT demonstrated gross total removal of the pituitary tumor, decompressed optic chiasm, and preservation of the pituitary stalk and gland (Fig. 1E and F, Fig. 2D). Pathologic examination revealed hemorrhagic pituitary adenoma with focal necrosis and fibrin deposition. The patient was discharged on the seventh postoperative day in stable condition.

Discussion

PPA can occur after resection of GPTs, particularly if there is significant residual tumor.2,7 As reported by Goel et al., giant pituitary adenomas are defined as those greater than 4 cm in greatest diameter.8 The treatment of GPTs can be a formidable challenge associated with a poor clinical course and surgical outcome.2,7 In most cases, either a primary transsphenoidal or transcranial approach, or a combination of both, have been used.2 PPA can occur after either transcranial or transphenoidal surgery if there is significant residual tumor after subtotal resection. In a review of six cases reported in the literature (Table 1),4,7, the tumors that appeared to be at highest risk of PPA were those characterized by significant intracranial extension. The onset of apoplectic symptoms occurred within 12 hours of the initial surgery followed by rapid neurologic deterioration (visual worsening, altered somnolence and consciousness) requiring emergent surgical re-exploration. These cases all resulted in fatal outcomes due to significant postoperative tumor swelling, hemorrhage, infarction, and necrosis precipitating further mass effect, cerebral edema and herniation syndrome (Table 1).4,7 Our case is unique in that the patient presented with PPA due to spontaneous hemorrhage into a small volume of residual tumor, in a delayed fashion (about 72 hours after surgery), and rapid diagnosis and emergent surgical intervention resulted in eventual gross total resection and a favorable neurologic outcome.

Although PA has been described in association with a wide spectrum of predisposing clinical situations, the exact etiology and pathophysiology remains poorly understood.8 Some have proposed that the size, soft consistency, and vascularity of the tumor may play a role in the causation of intratumoral hemorrhage.1,3,4,7 One would not expect our case to develop PPA given the initial size of the tumor (4.6 cm x 4.2 cm x 3.4 cm) and also lack of significant intracranial extension. Although the tumor was greater than 4 cm in the greatest diameter, it was on the lower spectrum of giant pituitary adenomas. In addition, the volume of residual tumor on the postoperative MRI scan was reported to occur in giant pituitary tumors (GPT) (greater than 4 cm in greatest diameter) after subtotal resection within the immediate postoperative period (within 12 hours).4 All of the previously reported cases demonstrated acute neurologic worsening with eventual fatal outcomes due to massive tumor swelling, intratumoral hemorrhage and infarction within the residual tumor. In this report, we describe a patient who presented with PPA after endoscopic transphenoidal removal of an invasive pituitary macroadenoma. Our case is unique in that: a) the volume of residual tumor was small, and therefore, not expected to be at risk of PPA, b) the apoplectic event occurred in a delayed fashion on the third postoperative day, and c) a favorable neurologic outcome was achieved. Although postoperative outcome may largely be attributed to the extent and location of tumor expansion as well as the presence of intratumoral hemorrhage or infarction,1,4,7 in contrast to the prior reports with fatal outcomes, a favorable outcome was achieved in our case due to the lack of intracranial extension, smaller size of the residual tumor, hemorrhage limited to the suprasellar region that did not extend into the subarachnoid space, and lack of tumor infarction and central necrosis. Early diagnosis and intervention with acute administration of fluids and glucocorticosteroids, and emergent transphenoidal surgical decompression are critical factors in achieving a favorable outcome.1,4 Some authors have demonstrated excellent neurologic recovery of visual deficits and oculomotor paresis following surgical intervention within 24 to 72 hours of onset of PA in some cases, as in those of PPA, the need for surgical decompression may be emergent due to diminished visual level of consciousness, rapid progression of visual impairment, and mass effect on the brain. In order to reduce or eliminate the risk of fatal PA, one should attempt gross total removal initially, if safely possible.1,4 Some GPTs may need a combined transcranial and transphenoidal approach with immediate resection cannot be achieved by either approach alone. Nonetheless, in some cases, radical resection may not be feasible because of cavernous sinus invasion.

Conclusions

Although most reported cases of postoperative pituitary apoplexy occur acutely in the immediate postoperative period, our case demonstrates that this entity can occur in a delayed fashion if residual tumor is present. Early detection and immediate intervention is paramount for achieving significant visual recovery and a favorable neurologic outcome.

References