

Fatal complication after transsphenoidal surgery of pituitary adenoma: case report

Complicação fatal após cirurgia transesfenoidal de adenoma em hipófise: relato de caso

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ABSTRACT

The objective of this study was to report a rare fatal complication in the postoperative period of transsphenoidal surgery of the pituitary gland (adenoma), with a brief review of the subject. The patient was a 54-year-old white man with acromegaly and severe heart failure, who after microsurgery developed blood pressure instability within 32 hours after the procedure and died. The autopsy revealed: hypertrophy and ventricular dilation with myocarditis, pericarditis and myocardial fibrosis; mesenteric ischemia with transmural coagulation necrosis of the intestinal loops; acute tubular necrosis; and hepatic steatosis. The findings are consistent with cardiogenic shock and abdominal sepsis due to necrosis of the intestinal loops.

Key words: acromegaly; cardiogenic shock; septic shock; pituitary neoplasia.

INTRODUCTION

Nowadays, two surgical transsphenoidal techniques are used to remove pituitary tumors: the microscopic, through stereoscopic microscopes; and the endoscopic, by endoscopy. Although some studies confirm that the endoscopic surgery have lower incidence of complications than the microscopic one⁽¹⁻³⁾, the literature reveals that despite it is a safe surgical procedure, with mortality rate of less than 1% when carried out by an experienced surgeon⁽⁴⁾, complications occur in the operative field at both kinds of surgery. The literature also points to the importance of considering the underlying disease and its comorbidities⁽⁴⁾. The objective of this work is to report a fatal case of a patient who underwent transsphenoidal microsurgery, with a short review of the literature on the complications of this surgery.

CASE REPORT

A 54-year-old white male cultivator from Quixeramobim (CE) presented with chief complaint of tiredness. History of

the present illness: six months ago, after stopping medication for pituitary adenoma (octreotide) initiated five years earlier, he began presenting dyspnea upon moderate exertion. He has felt mild oppressive precordial pain for some days, without irradiation, dyspnea upon minimal exertion, palpitation, sweating, and was then hospitalized. He refers tinnitus in the left ear and paresthesia in the left parietal region, of recent onset. The past medical history reveals a five-year-duration acromegaly, with implantation of a multisite pacemaker and an implantable cardioverter defibrillator (ICD) a year ago, due to a cardiopulmonary arrest. He is on digoxin, metoprolol, aldactone, amiodarone, furosemide, losartana potassica, omeprazole, dimeticone and cabergoline.

At the physical examination the patient is lucid and oriented. Cardiac auscultation reveals regular heart rhythm with S3, faint heart sounds, with a rate of 103 bpm. Blood pressure of 100 × 60 mmHg, vesicular murmur, with 18 breaths per minute; scaphoid abdomen; Traube's space is clear, painless on both superficial and deep palpation. Pulses are present in lower limbs, no cyanosis, no edema, force and sensitivity preserved, negative babinski. Preserved and conjugate eye movements.

Echocardiogram: left ventricle (LV) diastolic diameter is 114 mm (normal ≤ 59 mm), LV systolic diameter is 98 mm (normal ≤ 39 mm), LV mass is 1,060 g (normal ≤ 276 g). Left atrial diameter is 44 mm (normal ≤ 40 mm). Ejection fraction is 26% (normal 55%), severe diffuse LV hypokinesis. Significantly impaired LV systolic and diastolic functions. Preserved right ventricle (RV) function. Complete blood count, platelets, coagulation profile, sodium, potassium, urea, creatinine, and urinalysis within normal ranges.

The patient was hospitalized for stabilization of his clinical condition, with no response. Due to the preoperative risk assessment, a team of doctors decided for the transsphenoidal surgery. During the immediate postoperative period, the patient presented hemodynamic instability, and was placed on dobutamine to maintain blood pressure. At hour 32 of the postoperative period, he was found in cardiopulmonary arrest.

At autopsy, the patient has acromegalic facies with two tubes in the nasal cavity. Barrel-shaped thorax, with pacemaker implanted in the upper front left chest. At the opening of the skull, meninges are glistening in appearance; the brain was edematous. The pituitary gland was enlarged, protruding above the site of the sella turcica, with ecchymosis in 90% of its extension, friable, and a small portion of the gland preserved just in the infundibular region (**Figure 1**). To the touch, crepitus is noted in the wall of the sella turcica, bilaterally (sphenoid fracture). Frontal and ethmoidal paranasal sinuses with yellowish polypoid projections, the largest measuring 4 cm (**Figure 2**).

In the thoracic cavity, the enlarged heart weighs 1,360 g, with pericardial effusion of 400 ml (**Figures 3 and 4**). Dilated atrial and ventricular chambers with softening of the walls, and pacemaker wire inserted in the wall of RV. There are no thrombi. Permeable coronary arteries, and no mitral and tricuspid valve vegetations. The RV is 1.5 cm thick; the LV, 1.8 cm thick. Circumferences of cardiac valves: mitral, 12 cm; aortic, 9 cm; tricuspid, 8 cm; pulmonary, 10 cm.

Aerated lungs, with thin adhesions and 150 ml of yellow pleural fluid on the right side, showing no thrombi.

In the peritoneal cavity, the liver is enlarged (2,510 g) and congested. The pinkish intestinal loop segments limit the black segments in the jejunum and proximal ileum, with friable points (**Figures 5 and 6**). Intestines contain black pasty stools.

Microscopy of RV, LV and septum shows areas of necrosis with inflammatory infiltrate composed of eosinophils and lymphocytes, amidst myocardial muscle fibers, around vessels and visceral pericardium. Cardiac cells are enlarged, with central nuclei, some of them vacuolated and permeated by enlarged interstitial spaces with fibrotic areas. The clinical picture is that of focal myocarditis, myocardial fibrosis, and

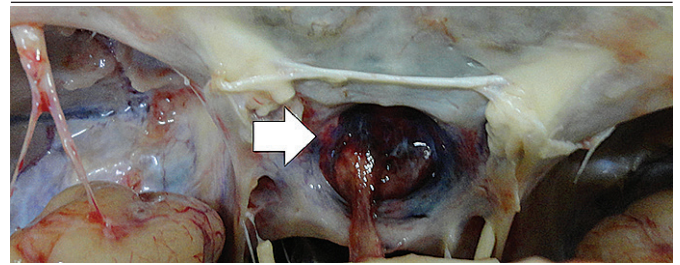


FIGURE 1 – Enlarged pituitary gland with ecchymoses (arrow)

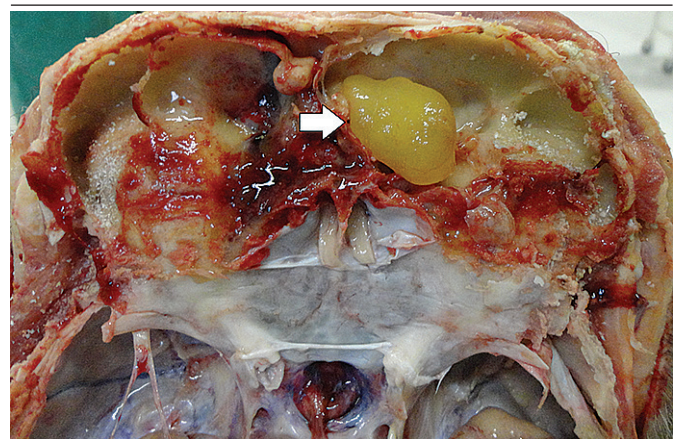


FIGURE 2 – Frontal and ethmoidal paranasal sinuses with yellowish polypoid projections (arrow)

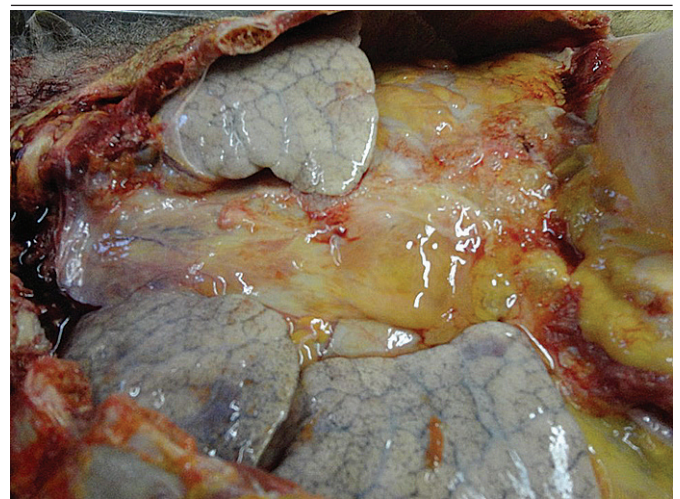


FIGURE 3 – Thoracic cavity evidencing cardiomegaly

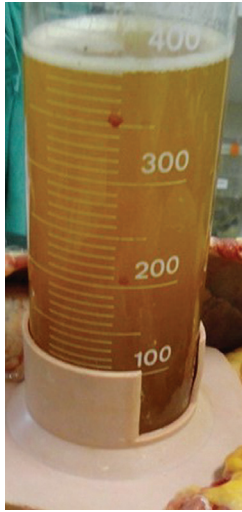


FIGURE 4 – Citrine-colored liquid



FIGURE 5 – Black small intestine loops



FIGURE 6 – Jejunal loops with friable points

mild pericarditis. The paranasal sinuses lesions have myxoid edematous stroma containing eosinophilic exudates, lined by ciliated respiratory epithelium, identified as inflammatory polyp. In the liver, there is a slight congestion and sinusoidal dilation, with steatosis and mild cholestasis. The intestine shows transmural coagulative necrosis (**Figure 7**); the kidney, bilateral acute tubular necrosis. There is viable tissue of anterior and posterior pituitary associated with coagulative necrosis with hemorrhagic areas. There are areas of monomorphic proliferation of oxyphilic chromophilic cells compatible with pituitary adenoma, containing cells of eccentric nucleus indented⁽⁵⁾ by fibrous bodies (**Figure 8**).

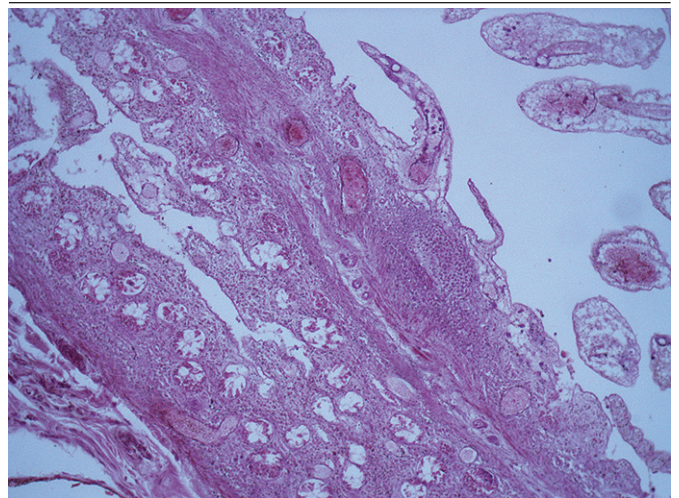


FIGURE 7 – Histological section of jejunum with transmural coagulative necrosis, HE 100×
HE: hematoxylin and eosin.

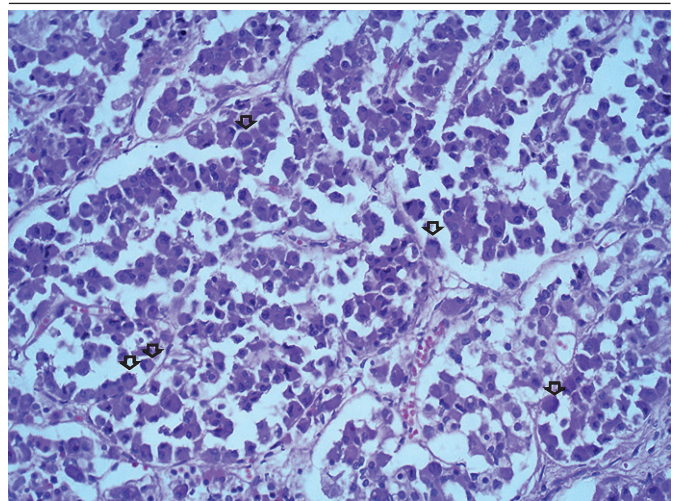


FIGURE 8 – Histological section of pituitary adenoma with cells of eccentric indented nucleus (arrows) HE 200×
HE: hematoxylin and eosin.

DISCUSSION

This is a patient with dilated cardiomyopathy and heart failure, functional class IV, who interrupted the treatment six months ago, and now is hospitalized for clinical decompensation, with no improvement. The transsphenoidal microsurgery was the chosen treatment. There is a consensus among authors about the existence of a specific acromegalic cardiomyopathy⁽⁶⁾, and the histopathological findings of this case are included in this concept.

The complications of transsphenoidal surgery are caused by a series of events, including improper indications, intercurrent medical conditions, anesthesia, local anatomy, endocrine disorders and surgical technique⁽⁴⁾. The procedure is well tolerated by older patients and those with severe diseases, as long as their functional and endocrine state is well evaluated in the preoperative period. Patients with acromegaly are prone to complications due to cardiomyopathy, and must be treated with somatostatin analogs preoperatively⁽⁴⁾ (the patient was using this medicine). They must remain intubated until they are completely awake, because of respiratory disorders⁽⁴⁾ resulting from anatomical distortions of soft tissues, cartilages, thoracic muscles, and craniofacial bones, which frequently cause obstructive sleep apnea and damage the respiratory function⁽⁷⁾. Deep vein thrombosis and pulmonary emboli frequently occur in these cases, requiring prophylaxis before surgery⁽⁴⁾.

At a survey published in 1997⁽⁴⁾, among the complications estimated by 958 different surgeons in transsphenoidal surgeries for different pituitary diseases, performed in the United States until the year 1996, 98% reported to have witnessed one or more complications. The most frequently reported complications in number of respondents were: diabetes insipidus (748), cerebrospinal fluid fistula (590), anterior pituitary insufficiency (563), nasal septum perforation (327), ophthalmoplegia (86), sinusitis (242), and hemorrhages (168). Other cited complications were: meningitis (192), postoperative vision loss (179), and carotid artery injury (114). A total of 129 patients died. These deaths were mainly linked to carotid artery ruptures within the cavernous sinus and cavernous sinus thrombosis⁽⁴⁾. The incidence of complications is higher in the hands of less experienced surgeons.

Barker *et al.* (2003) also published a study on complications of transsphenoidal neurosurgery in the United States, from 1996 to 2000. A total of 5,497 surgeries were carried out at 538 hospitals by 825 surgeons. Complications were similar, with reports of thromboembolic events. The mortality rate was 0.9%-0.65%, relating lower complication rates to higher-volume surgeons⁽⁸⁾.

More recently, surgeons from Mexico City reported 3,004 cases of patients who underwent transsphenoidal surgery for pituitary tumors: a sublabial approach was used in 3,000 operations, while a transnasal approach was used in the remaining four. The mortality rate was 1.6%⁽⁹⁾.

It is easy to note that, in our case, the patient's systemic clinical conditions were not ideal, even for a procedure considered safe, despite the severe complications already described. The autopsy finding of mesenteric ischemia with intestinal loop necrosis was not clinically suspected. However, it is necessary to remember that he was a postoperative neurosurgical patient, under analgesia and sedation. In this pathophysiology, mesenteric ischemia is caused, among other things, by heart failure and shock. Based on the above considerations, we have parameters for the conclusion of the case.

CONCLUSION

The hemodynamic instability of the patient (with functional class IV heart failure), who underwent transsphenoidal surgery, and used dobutamine (since the intraoperative period) for 32 hours; the mesenteric ischemia with intestinal loop necrosis found at autopsy (not clinically noted); and the other autopsy findings in heart, liver and kidneys, suggest that the clinical picture of instability worsened with cardiogenic shock and sepsis, becoming irreversible, and causing the patient's death. The findings in the pituitary gland result from surgical trauma. As seen in the literature, death causes in transsphenoidal surgery are related to uncompensated underlying diseases, deep vein thrombosis, pulmonary emboli, and risks posed by this surgery site combined with less experienced surgeons. The case draws attention to the necessary accuracy in the preoperative assessment of patients with severe heart failure.

RESUMO

O objetivo deste estudo é relatar uma rara complicação fatal no pós-operatório de cirurgia transesfenoidal de hipófise (adenoma), com breve revisão sobre o tema. Homem branco, 54 anos, com acromegalia e insuficiência cardíaca grave que, após microcirurgia, evoluiu com instabilidade pressórica nas 32 horas seguintes ao procedimento, o que levou ao óbito. Necropsia evidenciou hipertrofia e dilatação ventricular com miocardite, miocardiofibrose e pericardite; isquemia mesentérica com necrose de coagulação transmural em alças intestinais; necrose tubular aguda; e esteatose hepática. Os achados são compatíveis com choque cardiogênico e sepse abdominal pela necrose de alças intestinais.

Unitermos: acromegalia; choque cardiogênico; choque séptico; neoplasia de pituitária.

REFERENCES

1. Ammirati M, Wei L, Ciric I. Short-term outcome of endoscopic versus microscopic pituitary adenoma surgery: a systematic review and meta-analysis. *J Neurol Neurosurg Psychiatry*. 2013; 84(8): 843-9.
2. Gao Y, Zhong C, Wang Y, et al. Endoscopic versus microscopic transsphenoidal pituitary adenoma surgery: a meta-analysis. *World J Surg Oncol*. 2014; 12: 94.
3. Tabaei A, Anand VK, Barrón Y, et al. Endoscopic pituitary surgery: a systematic review and meta-analysis. *J Neurosurg*. 2009; 111(3): 545-54.
4. Ciric I, Ragin A, Baumgartner C, et al. Complications of transsphenoidal surgery: results of a national survey, review of the literature, and personal experience. *Neurosurgery*. 1997; 40(2): 225-36.
5. Mete O, Asa SL. Growth hormone-producing adenoma. In: Nosé V, Asa SL, Erikson LA, Lopes BS, Tischler AS, editors. *Diagnostic pathology: endocrine*. 1st ed. Salt Lake City: Amirsys Publishing; 2012. p. 24-6.
6. Clayton RN. Cardiovascular function in acromegaly. *Endocr Rev*. 2003; 24(3): 272-7.
7. Camilo GB, Guimarães FS, Silva DP, et al. Pulmonary function testing and chest tomography in patients with acromegaly. *Multidiscip Respir Med*. 2013; 8(1): 70.
8. Barker FG, Klibanski A, Swearingen B. Transsphenoidal surgery for pituitary tumors in the United States, 1996-2000: mortality, morbidity, and the effects of hospital and surgeon volume. *J Clin Endocrinol Metab*. 2003; 88(10): 4709-19.
9. Loyo-Varela M, Herrada-Pineda T, Revilla-Pacheco F, Manrique-Guzman S. Pituitary tumor surgery: review of 3004 cases. *World Neurosurg*. 2013; 79(2): 331-6.

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