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CASE REPORT

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Pituitary apoplexy associated with gram-negative meningitis following transsphenoidal surgery

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Abstract

Background Pituitary apoplexy (PA) is a rare but potentially life-threatening condition. While it is uncommon, it can present with findings that are clinically indistinguishable from acute bacterial meningitis. We report an unusual case of simultaneous coexistence of bacterial meningoencephalitis and pituitary apoplexy following transsphenoidal surgery (TSS) for pituitary macroadenoma, emphasizing the possibility of coexistence of the two entities.

Case presentation A 62-year-old man was admitted with a moderate headache, gait disturbance, and progressively decreasing vision. Sellar magnetic resonance imaging showed a giant pituitary tumor of 4 × 5 cm with invasion of the cavernous sinus bilaterally, and a mass effect on the optic chiasm. The patient underwent a TSS and partial resection of a giant pituitary tumor. On postoperative day 11, he presented with an acute, severe headache and altered sensorium. An urgent computed tomography (CT) scan revealed hemorrhagic swelling of the residual. A complete analysis of the anterior pituitary hormones revealed panhypopituitarism. Administering steroid ameliorated the clinical features, but after decreasing the dose, the patient continued to deteriorate in his neurological status, a high fever, and marked stiffness were noted on postoperative day 14. Given the neck stiffness, leukocytosis, and high C-reactive protein level, acute meningitis was suspected, and the cerebrospinal fluid (CSF) was tested, which was consistent with acute bacterial meningitis. In the results of the bacterial cultures of the CSF, *E. coli* was identified and switched to ceftriaxone. The patient's neurological status and body temperature improved gradually. CSF test results returned to normal levels, and ceftriaxone was discontinued on day 10.

Conclusions This is a report on a case of a giant pituitary tumor that developed late postoperative PA after having undergone a partial tumor resection. A postoperative CT scan showed hemorrhagic expansion of the residual tumor mass. Further, the patient exhibited typical symptoms of acute meningoencephalitis, the result of the cultures of the CSF was positive, and the patient's general condition deteriorated. In addition, laboratory findings indicated leukocytosis, an elevated C-reactive protein level, and neutrophilic pleocytosis. We highlighted diagnostic challenges and therapeutic delays arising as a result of rare concomitance.

Keywords Pituitary apoplexy, Pituitary macroadenoma, Bacterial meningoencephalitis, Transsphenoidal surgery, Cortisol

Background

Pituitary apoplexy (PA) is a rare clinical syndrome resulting from the rapid and often life-threatening expansion in the majority of cases of a pituitary tumor within the sella turcica, due to either hemorrhage or infarction [1]. The phenomenon of postoperative PA following partial resection of a pituitary adenoma has been described by Goel

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et al. in 1995 [2]. The incidence of this condition reported in the literature is variable and ranges from 0.6% to 27.7% [3]. The clinical features of PA include acute severe headache, vomiting, ophthalmoplegia, and, occasionally, signs of meningeal irritation [4]. While it is uncommon, PA can present with findings clinically indistinguishable from acute bacterial meningitis [5]. Meningitis and cerebrospinal fluid (CSF) rhinorrhea remains major concerns following transsphenoidal surgery (TSS) for pituitary macroadenoma (PM). The overall incidence of postoperative meningitis following endoscopic endonasal skull base surgery was 1.8% [6]. We report an unusual case of simultaneous coexistence of bacterial meningoencephalitis (BM) and PA following TSS for PM, emphasizing the possibility of coexistence of the two entities.

Case presentation

A 62-year-old man was admitted with a moderate headache, gait disturbance, and progressively decreasing vision in both eyes for 3 years. Past medical history revealed mild hypertension and glaucoma that were controlled with regular medication. A neurological examination revealed bitemporal hemianopsia. Indirect ophthalmoscopy revealed no papilloedema bilaterally. Sellar magnetic resonance imaging (MRI) showed a giant pituitary tumor of 4×5 cm with large suprasellar and parasellar components of the tumor with invasion of the cavernous sinus bilaterally, and a mass effect on the optic chiasm (Fig. 1). Under hydrocortisone cover, the patient underwent a TSS and partial resection of a giant pituitary tumor (Fig. 2). An intraoperative leak was detected, and sella floor reconstruction was done using biological allograft with fat packing of the sphenoid sinus. A second piece of allograft is then placed as an overlay covering the entire defect, with fibrin glue applied over the flap. The patient received ampicillin-sulbactame 1 g intravenously prior to the start of the procedure and continued in the postoperative period. The pathological reports indicated a pituitary adenoma. Immediately after surgery, he developed diabetes insipidus and was started on minirin 60 mg per day. The patient was discharged from the hospital in good condition. On postoperative day 11, he presented to the emergency unit with an acute, severe headache and altered sensorium. On examination, his blood pressure was 150/90 mm Hg; pulse rate was 84 beat/min; body temperature was 36.7 °C; and respiration rate was 16 breaths/min. The patient was drowsy but still responsive. No CSF rhinorrhea was seen. A

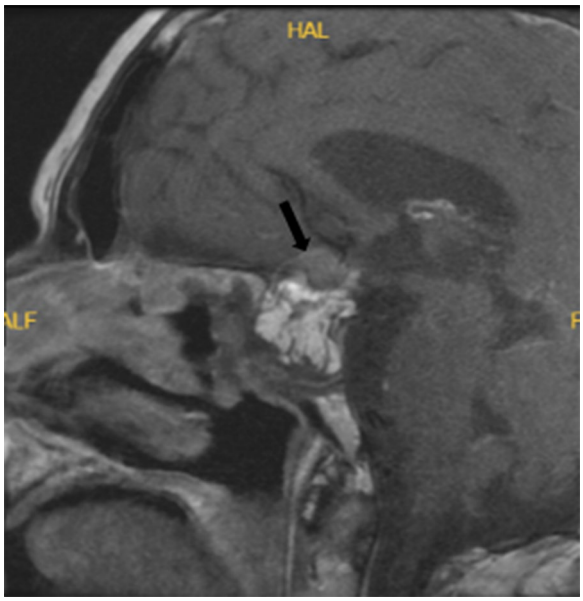

Fig. 2 Postoperative T1-weighted contrast enhanced pituitary MRI showed heterogenous internal high-intensity signals indicating fat packing of the sphenoid sinus and tumor residue (black arrow)

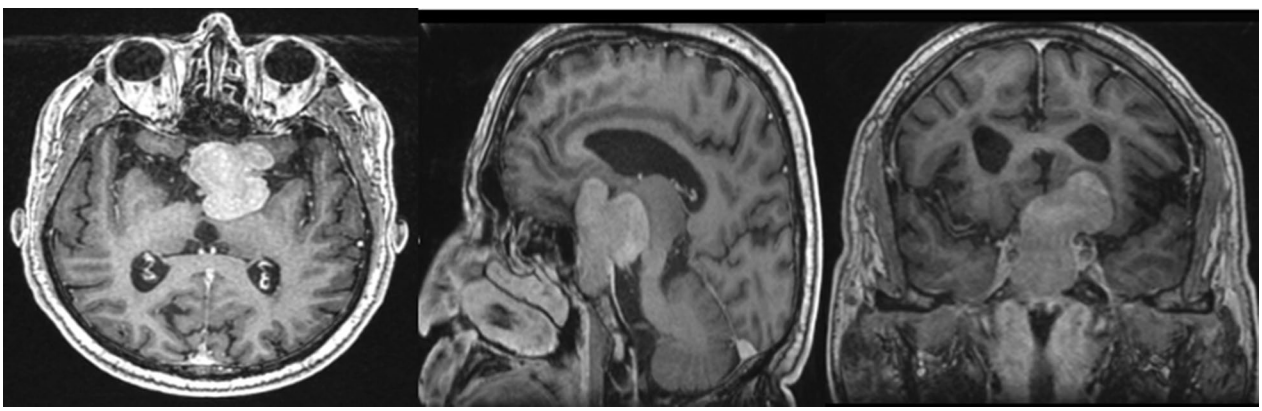

Fig. 1 A T1-weighted axial, sagittal, and coronal gadolinium-enhanced MRI scan of the brain shows a giant pituitary mass with large suprasellar and parasellar components

neurological examination revealed only partial ptosis of the left eye and a visual field defect in the bitemporal region. No neck stiffness was noted. An urgent computed tomography (CT) scan revealed hemorrhagic swelling of the residual with hemorrhage (Fig. 3). In the laboratory evaluations, neutrophilic leukocytosis (14,300/mm^3, 75% neutrophils), elevated C-reactive protein (68 mg/L), low sodium (132 mEq/L), an absence of blood keto acids, and normal blood and urine osmolarity were noted. A complete analysis of the anterior pituitary hormones was performed and revealed free T4 of 0.61 ng/dL, TSH of 0.20 µU/L, LH of 0.8 mIU/mL, FSH of 4.8 mIU/mL, prolactin of 3.2 µg, and a cortisol baseline of 7.2 µg/dL (Table 1). As the patient was neurologically stable, urgent decompression was deferred and conservative management was opted for. Cortisone substitution was immediately started (hydrocortisone, 50 mg every 6 h). Administering steroid ameliorated the clinical features, but after decreasing the dose, the patient continued to deteriorate in his neurological status, and hypotension, a high fever (up to 38.9 °C), and marked stiffness were noted on postoperative day 14. Given the neck stiffness, leukocytosis, and high C-reactive protein level, acute meningitis was suspected, and the CSF was tested, which revealed an increased leukocyte count of 580/µL, with neutrophilic granulocytes (84%) predominating, an increased RBC count of 172/mm3, an increased total protein content of 1689 mg/L, decreased glucose (1 mg/dL), and elevated lactate (9.93 mmol/L) levels. Head MRI showed moderate dilatation of both lateral ventricles, surrounded by high signal intensity along with ependymal, suggesting ventriculitis (Fig. 4). Based on MRI characteristics and

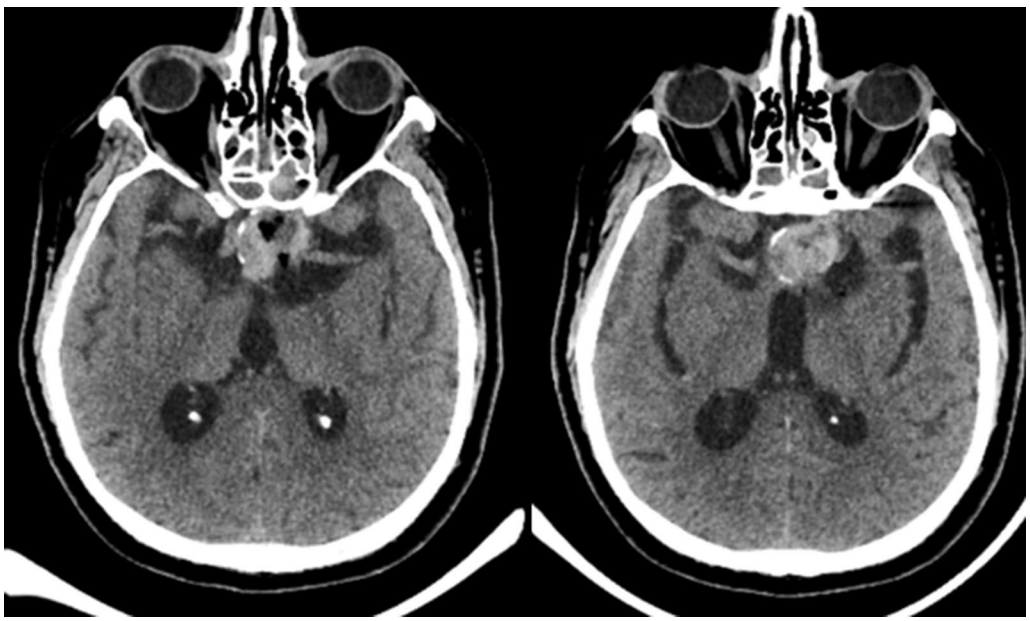

Fig. 3 Computed tomography of the brain in the axial plane showing a hyperdense lesion in the suprasellar region compatible with intralesional hemorrhage

Table 1 Serum hormone levels in the patient

Hormone	Preoperative value	Early postoperative	On postoperative day 11	Reference range
Cortisol (µg/dL) 8:00 AM	13.7	24.4	7.2	5.2–22.4
Free thyroxine (ng/dL)	0.76	1.12	0.61	0.89–1.76
Thyrotropin (µU/L)	2.64	0.23	0.2	0.55–4.78
Adrenocorticotropic hormone (pg/mL)	34.45	35.8	19.5	≤ 46
Prolactin (µg /L)	9.2	10	3.2	2.1–17.7
Lutenizing hormone (mIU/mL)	3.6	0.8	0.8	1.5–9.3
Follicle-stimulating hormone (mIU/mL)	49.2	6.4	4.8	1.4–18.1

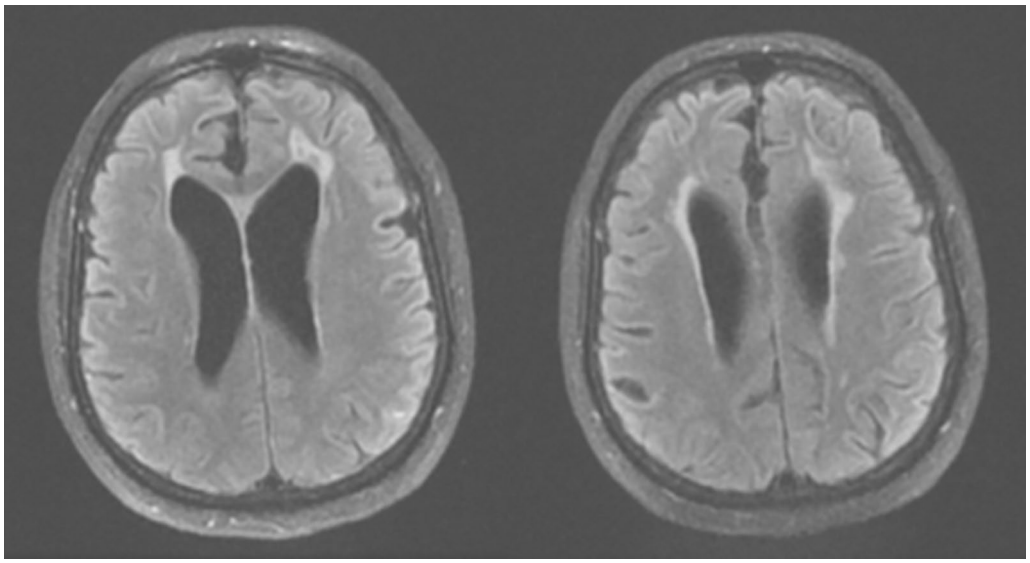

Fig. 4 The axial FLAIR MRI showed moderate dilatation of both lateral ventricles, surrounded by high signal intensity along with ependymal, suggesting ventriculitis

CSF results, the patient was diagnosed with meningitis. Gram staining showed gram-negative bacilli growth, and empirical therapy with vancomycin (1 g every 12 h) and meropenem (1000 mg every 6 h) was started. In the results of the bacterial cultures of the CSF, *E. coli* was identified and switched to ceftriaxone (2 g per 12 h). The patient's neurological status and body temperature improved gradually. CSF test results returned to normal levels, and ceftriaxone was discontinued on day 10. The patient was discharged home in good condition on hydrocortisone (20 mg every morning and 10 mg every evening), L-thyroxine (50 μg by mouth daily), and minirin (60 μg daily) for his partial hypopituitarism.

Discussion

PA is a rare and life-threatening condition characterized by headache, visual loss, ophthalmoplegia, and altered mental status caused by sudden hemorrhage or infarction of the pituitary gland [7]. Cases of PA with initial presentation mimicking infectious meningoencephalitis were previously published in the literature [4, 8–11]. The initial management of a patient presented with PA includes close observation and, if necessary, the administration of corticosteroid therapy [5]. Some previous studies advocate urgent decompression of the pituitary fossa [5], especially if a severe neuro-ophthalmological deficit does exist. BM should be included in the differential diagnosis of PA if the patient following TSS presents with an acute headache associated with fever, altered sensation, meningeal irritation, and ocular paresis.

This is a report on a case of a giant pituitary tumor that developed late postoperative PA after having undergone a partial tumor resection. A postoperative CT scan showed hemorrhagic expansion of the residual tumor mass. Further, the patient exhibited typical symptoms of acute meningoencephalitis, the result of the cultures of the CSF was positive, and the patient's general condition deteriorated. In addition, laboratory findings indicated leukocytosis, an elevated C-reactive protein level, and neutrophilic pleocytosis. Several explanations account for the diagnostic delays. Initially, the absence of typical findings of meningoencephalitis can also be due to the steroid therapy that was started for pituitary insufficiency.

Intraoperative CSF leakage was noted in our patient. The presumed source of meningitis associated with TSS is perioperative contamination through a CSF leak. The subarachnoid space should not be violated during TSS, but the tenacity with which pituitary tumors may adhere to the sellar roof makes occasional CSF leakage and meningitis predictable complications [12]. Our patient did not have obvious postoperative cerebrospinal rhinorrhea, and the time between surgery and clear manifestations of meningitis was 14 days.

E. coli was the causative agent of BM in our report. The preponderance of meningitis due to gram-negative organism seen in patients with TSS might support the contention that hospitalization and the initiation of antibiotics alter host flora and allow for meningitis with opportunistic bacteria in patients with CSF leaks [12]. If a patient develops meningitis in the setting of TSS, the

spectrum of activity for an empirical antibiotic regimen should include nosocomial pathogens, especially if perioperative antibiotics have been used [12].

BM and PA are by themselves serious TSS complications, and they are rarely seen simultaneously. Concurrent BM exacerbating the clinical course of PA, which is itself a deadly disease, is a rare coexistence. PA and BM can share similar symptoms such as neurological signs, fever or headache, altered sensation, and rarely meningismus, so in those patients who present with these symptoms, a diagnostic challenge and therapeutic delay could arise. Early identification of each of these entities is imperative for timely management. Thorough neurological monitoring and serial imaging follow-up would be beneficial in making an accurate diagnosis.

Conclusions

To the best of our knowledge, we report the first case where postoperative BM was associated with PA in a patient following TSS. We highlighted diagnostic challenges and therapeutic delays arising as a result of rare concomitance.

Abbreviations

PA	Pituitary apoplexy
PM	Pituitary macroadenoma
CSF	Cerebrospinal fluid
TSS	Transsphenoidal surgery
BM	Bacterial meningoencephalitis
MRI	Magnetic resonance imaging
CT	Computed tomography
FLAIR	Fluid attenuated inversion recovery

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Availability of data and materials
The authors confirm that the data supporting the findings of the study are available within the article.

Declarations

Ethics approval and consent to participate
Ethical approval was not sought for this case report as it was not required due to the nature of the case report.

Consent for publication
Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for the review of the Editor-in-Chief of this journal on request.

Competing interests
The authors declare that they have no competing interests during the writing or submission of this article.

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