



Primary Pituitary Abscess: Two Case Reports

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Abstract

Introduction Pituitary abscess is a rare disorder that represents a small fraction of all pituitary lesions. In this report, we present two additional cases with unique features to promote awareness and prompt surgical intervention.

Case Presentations A 42-year-old male presented with headache, photophobia, subjective fever, dizziness, imbalance, nausea, and vomiting. A pituitary hormone panel confirmed hypothyroidism and suggested central hypogonadism and secondary adrenal insufficiency. Magnetic resonance imaging (MRI) showed a large sellar mass measuring 2.5 cm × 1.8 cm × 1.6 cm (CC × XT × AP). A 76-year-old woman presented with several months of headaches and unsteady gait in the setting of a known previously asymptomatic sellar lesion, measuring 1.8 cm × 1.2 cm × 1.5 cm (XT × CC × AP). Repeat MRI demonstrated possible hemorrhage within the lesion. In both cases, a preliminary diagnosis of pituitary macroadenoma was made, but transsphenoidal surgery revealed an encapsulated abscess; cultures obtained from the abscesses stained for gram-positive bacteria.

Conclusion Pituitary abscess is a rare, potentially life-threatening disorder that may be easily mistaken for other sellar lesions. In this review, we contribute two additional cases of pituitary abscesses to increase awareness and emphasize the importance of proper diagnosis and management.

Keywords

- ▶ pituitary abscess
- ▶ sellar lesions
- ▶ hypopituitarism
- ▶ case reports

Introduction

Pituitary abscess is a rare and frequently misdiagnosed disorder, often being an incidental finding. Less than 500 cases have been reported in the literature to date, accounting for approximately 1% of all pituitary lesions.¹ The majority of cases are considered to be primary pituitary abscesses, which are the result of infection in an otherwise healthy pituitary gland. The infection can reach the central nervous system via three primary routes: hematogenous seeding from an extracranial location (such as an upper respiratory tract infection), a direct extension from a contiguous extracranial region, or by being introduced by a previous neurosurgical procedure.² Secondary

pituitary abscesses, which are reported to occur in only one-third of cases, arise from preexisting lesions, such as pituitary adenomas, Rathke cleft cysts, and craniopharyngiomas.³

The most common presenting clinical features of pituitary abscess are headache, visual abnormalities, and endocrine abnormalities that range from a mild hyperprolactinemia to a severe panhypopituitarism.^{4–6} Headache is by far the most common symptom, and the location, frequency, and intensity are all highly variable. Key radiological features on magnetic resonance imaging (MRI) include hypointensity or isointensity on T1-weighted imaging, hyperintensity or isointensity on T2-weighted imaging, and rim enhancement after gadolinium-based contrast injection.^{1,7,8}

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Pituitary abscess is often misdiagnosed as a pituitary adenoma due to their highly similar clinical presentations and the substantially higher prevalence of pituitary adenomas. Fortunately, the preferred definitive treatment is the same for both—a surgical pituitary resection/evacuation, largely preferred via an endoscopic transnasal route at our center. Herein, we add to the existing literature by presenting two additional interesting cases of pituitary abscess with unique features.

Case Presentation #1

Patient #1 was a 42-year-old male who presented with 2 days of a progressively worsening frontal headache radiating to the right side of his neck. During this time, he reported new-onset photophobia, subjective fever, dizziness, imbalance, and nausea. The patient had a 1 year history of prediabetes, untreated diabetes insipidus (DI), hypothyroidism treated with levothyroxine, and diminished libido. On presentation, the patient denied fever, sore throat, cough, visual change, head trauma, rhinorrhea, fatigue, seizures, and photophobia. Vital signs were within normal limits and physical exam was unremarkable.

Laboratory results confirmed hypothyroidism, with a T4 level of 0.5 ng/dL (reference range 0.6–1.5 ng/dL) and a thyroid-stimulating hormone (TSH) of 4.88 μ U/mL (reference range 0.30–4.20 μ U/mL). Other hormone levels were low including a testosterone level of 8 ng/dL (reference range 250–1,000 ng/dL), an IGF-1 level of 38 ng/mL (reference range 52–328 ng/mL), and a cortisol level of 3.9 μ g/dL (reference range 4–20 μ g/dL), consistent with hypopituitarism. Follicle-stimulating hormone, luteinizing hormone, and prolactin were normal. A noncontrast head computed tomography showed an enlarged sella turcica. Routine brain MRI showed a large sellar and suprasellar mass measuring 2.5 cm craniocaudal \times 1.8 cm mediolateral \times 1.6 cm anteroposterior that was hyperintense on T1-weighted images and isointense on T2-weighted images. Rim enhancement was observed following administration of a gadolinium-based contrast (**► Fig. 1**). The lesion elevated and compressed the optic chiasm. A preliminary diagnosis of pituitary macroadenoma was made.

The patient underwent uncomplicated bilateral endoscopic transsphenoidal surgical resection 2 days after presentation. The lesion was found to be an encapsulated abscess within the pituitary gland. This was evacuated, and the capsule was resected. The patient tolerated the procedure well. After the procedure, the patient reported complete relief of his headache and nausea/vomiting. The patient was administered metronidazole, vancomycin, and ceftriaxone postoperatively, in addition to hydrocortisone for his adrenal insufficiency (AI). Cultures obtained from the abscess fluid stained for gram-positive bacteria, including *Staphylococcus epidermidis* and *Corynebacterium propinquum*. After 10 days, the patient was discharged with 600 mg of oral linezolid for a 3-week course, 15/5 mg of hydrocortisone daily for a month, and 88 mcg of levothyroxine daily indefinitely.

Three weeks after discharge, he presented for follow-up at the infectious disease (ID) clinic for outpatient parenteral

antimicrobial therapy follow-up. Patient reported persistent blurry vision and floaters at that time, with improvement of headaches and fever. ID discontinued antibiotic therapy after an additional 2 weeks of confirmed symptom resolution. Thyroid function tests 1-month postoperatively showed normalization of free T4 and TSH on levothyroxine (0.9 ng/dL and 0.05 μ U/mL, respectively). The patient's prior DI persisted and he was maintained on 0.05 mg desmopressin twice daily. Other hormones were not assessed at this time. The initial MRI done 1 month after surgery revealed expected postsurgical changes (**► Fig. 1**). Follow-up imaging at 2 months showed an otherwise largely reduced sella compared to the preoperative MRI, with residual enhancement within the posterior portion of the sella and along the infundibulum. Another follow-up MRI was scheduled for 1 year later, but the patient did not return for the appointment.

Case Presentation #2

Patient #2 was a 76-year-old woman with a history of Graves' disease complicated by post-ablative hypothyroidism, treated with levothyroxine, and type II diabetes mellitus who was incidentally discovered to have a benign sellar mass on a contrast-enhanced MRI of the brain. The mass measured up to 13 mm in the largest diameter at that time, abutting the optic chiasm. Because the patient was asymptomatic and comprehensive review of systems was negative, the patient was discharged.

Nine months later, the patient started experiencing visual abnormalities, including ptosis and diplopia, along with unsteady gait. Endocrinology confirmed a diagnosis of AI and started the patient on daily hydrocortisone. A repeat brain MRI demonstrated that the lesion had grown to measure 1.8 cm mediolateral \times 1.2 cm craniocaudal \times 1.5 cm anteroposterior. The lesion was slightly hyperintense on T1-weighted imaging and slightly hypointense on T2-weighted imaging, lacking appreciable internal enhancement after administration of gadolinium-based contrast.

Six months later, the patient presented with several months of sharp, severe left frontal headaches and worsening unsteady gait. Her physical and neurological exams were unremarkable, aside from the inability to perform tandem gait. Repeat MRI demonstrated possible hemorrhage within the lesion, now with peripheral rim enhancement of the lesion after administration of contrast (**► Fig. 2**). A preliminary diagnosis of pituitary macroadenoma was made. The patient underwent uncomplicated bilateral endoscopic transsphenoidal surgical resection 10 days after this presentation. Intraoperative findings were similar to the above case, demonstrating an encapsulated abscess within the pituitary gland. The patient tolerated the procedure well and was started on broad-spectrum antibiotics, including ceftriaxone, metronidazole, and vancomycin. The abscess tissue was sent for cultures, which grew *Propionibacterium acnes* and *Staphylococcus epidermidis*. The patient was discharged with ceftriaxone 2 g intravenous twice daily via her PICC (peripherally inserted central catheter) line and 500 mg oral metronidazole three times daily.

The patient's symptoms significantly improved postoperatively; her headaches improved both in intensity and

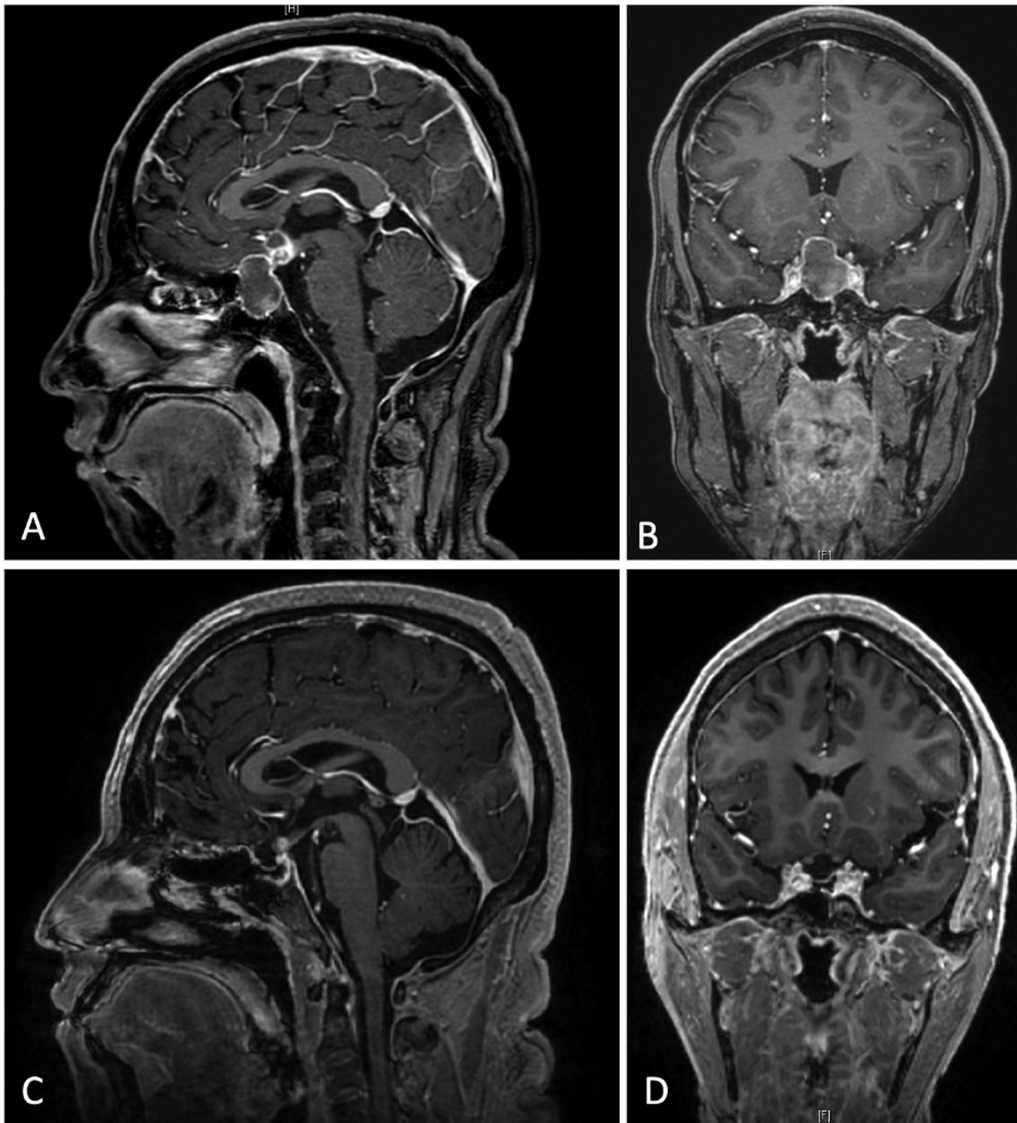


Fig. 1 Case 1: pre- and post-resection MRI of sella. Preoperative T1-weighted contrast-enhanced MRI in the sagittal plane (A) and coronal plane (B) demonstrating a large sellar and suprasellar mass with rim enhancement, elevating and compressing the optic chiasm. Postoperative T1-weighted contrast enhanced MRI in the sagittal plane (C) and coronal plane (D) demonstrating postoperative changes. MRI, magnetic resonance imaging.

frequency after 1 month. MRI at 1 month showed near resolution of the suprasellar collection and postoperative changes (►Fig. 2), and follow-up imaging at 4 months and 1 year demonstrated interval decreases in size of the remaining lesion. At the 1-month follow-up, antibiotics were discontinued as per ID recommendations due to resolution of symptoms and negative blood cultures. The hypothyroidism and AI persisted, for which the patient has been maintained on 55 mcg daily levothyroxine and 15 mg daily and 5 mg nightly hydrocortisone. The patient continued to follow up with endocrinology every 3 months.

Discussion

We present here two cases of pituitary abscess treated at a high volume, urban academic center. The most recent review done by Stringer et al identifies a total of 488 cases of

pituitary abscess, highlighting the rarity of the disease. Two literature reviews^{6,9} reported an incidence of pituitary abscess of 0.6% among 1,000 patients and 3,500 patients with surgically treated pituitary lesions at their respective institutions. Considering the rarity of pituitary abscess, along with its potentially life-threatening nature, more robust studies are required to understand the nature of the disease.

Etiology

Primary pituitary abscess usually arise as a result of hematogenous seeding in previously healthy pituitary glands.³ Shkarubo et al present two cases that are suspected to be a result of primary hematogenous seeding. In the first case, hematogenous infection may have occurred after an upper respiratory tract infection, and in the second case, a prior dental procedure may have facilitated hematogenous spread of an existing sinus infection. Secondary pituitary abscess

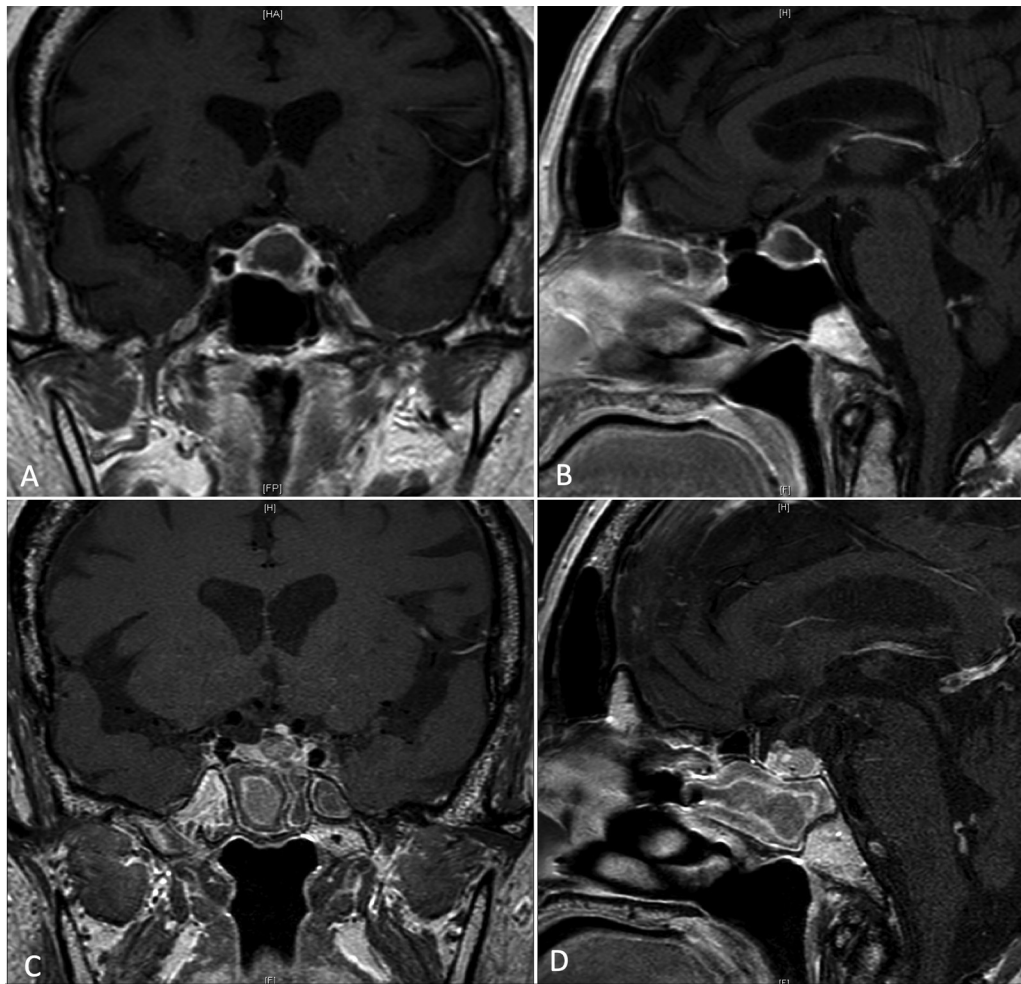


Fig. 2 Case 2: pre- and post-resection MRI of sella. Preoperative T1-weighted contrast-enhanced MRI in the coronal plane (A) and sagittal plane (B) demonstrating sellar mass encroaching on optic chiasm with hemorrhage within the lesion and peripheral rim enhancement. Postoperative T1-weighted contrast enhanced MRI in the coronal plane (C) and sagittal plane (D) demonstrating postoperative changes. MRI, magnetic resonance imaging.

usually occurs after surgical treatment, irradiation, or because of the direct presence of another pathology within the sellar area.¹⁰ In our cases, since both patients lacked prior surgical treatment, irradiation, and other pathology in the sellar area, it is most likely that they were both primary pituitary abscesses. Furthermore, gram-positive bacteria are the most common causative agents for primary, culture-positive pituitary abscess, and cultures obtained from both of our patients grew gram-positive bacteria.⁸ On the other hand, *Aspergillus fumigatus* is most frequently noted in secondary pituitary abscess.⁸

Despite both of our cases returning positive bacterial culture results, many cases lack evidence of bacterial infection upon pathogenic microorganism staining. Prior reports have demonstrated that up to 50% of pituitary abscesses yielded negative culture results, indicating the presence of a sterile abscess.^{1,9} Interestingly, a previous study found a differential rate of sterile abscesses in primary versus secondary abscesses with rates of 15% versus 35%, respectively.⁸ Some surgeons attribute the high frequency of sterile abscesses to the view that those abscesses may not be abscesses at all; rather, sites of aseptic, liquefactive necrosis due to a previously infarcted

pituitary gland or tumor.⁹ However, many surgeons disagree with this view, and suggest that sterile cultures may result from either preoperative antibiotic therapy or inadequate bacteriological technique.³ Stringer et al reinforce the latter hypothesis by discovering that preoperative antibiotic therapy leads to an increased chance of a negative culture result.

Clinical Presentation

In the majority of reports, headache is the most common presenting symptom of pituitary abscess with the most recent review demonstrating a frequency of 76.2%.¹ Despite being the most common symptom, however, the location of reported headaches can be variable, including bifrontal, retroorbital, and vertex headaches.⁹ Due to the lack of a characteristic pattern, presence of a headache may not be a helpful tool for diagnosis of a pituitary abscess, and both clinical features, as well as laboratory results reflective of pituitary hypofunction, may be more useful to aid in diagnosis.

Another common presenting feature of pituitary abscess is DI. Stringer et al report an overall frequency of 27.3%, although it should be noted that this statistic generally refers to the presence of polydipsia and polyuria rather than a

confirmed diagnosis of DI. Overall, the literature shows a frequency of DI ranging from 42.1 to 69.7%^{2,9} in individual case series. DI and pituitary insufficiency are both useful tools in the diagnosis of a pituitary abscess because neither is a common presentation in the setting of a pituitary adenoma. Since pituitary abscess is most commonly misdiagnosed as a pituitary adenoma, and pituitary adenomas are the most prevalent sellar masses, presence of either of these two symptoms may help in shifting the diagnosis away from pituitary adenoma.^{3,11}

Visual disturbances, including changes in the visual field and in visual acuity, are also a common presenting symptom of pituitary abscess. The frequency of visual disturbances in patients with pituitary abscess ranges from 22.2 to 45.5%.^{2,3,8,9} Visual disturbances vary greatly and can include temporal hemianopsia, photophobia, diplopia, unilateral ophthalmoplegia, and extraocular movement abnormalities.^{2,3,9} Inflammation of the optic nerves due to pituitary abscess has been theorized to be the mechanism underlying visual disturbances.¹¹

Despite variability in the type of symptoms that patients may present with, prior studies have found that the median time from symptom onset to presentation is 120 days, with an interquartile range of 30 to 360 days. In our first patient, although the presenting chief complaint was an acute-onset headache, symptoms of diabetes insipidus had been ongoing

for several months prior. Our second patient followed a similar course, with an incidental mass being found 2 years before symptom onset. This second case highlights the chronic nature of the disease, as many patients may have an asymptomatic pituitary abscess that only becomes symptomatic after a certain level of growth. Considering the variable length between symptom onset and presentation, and often asymptomatic nature of this pathology, the prevalence of undiagnosed pituitary abscess can be postulated to be much greater than the rate of those cases confirmed by surgical resection. For this reason, it is important to maintain close follow-up of patients with suspected pituitary adenomas, particularly those that are nonfunctional.

Radiological Findings

The most consistent radiological feature of pituitary abscess is the presence of a cystic or partially cystic sellar mass on MRI.^{2,3,8,9} These masses have an average diameter of 1.7 cm, ranging from 1.0 to 2.9 cm.⁷ In most cases, pituitary abscesses display hypointensity or isointensity on T1-weighted imaging, hyperintensity or isointensity on T2-weighted imaging, and rim enhancement after gadolinium injection.^{2,3,8-10} However, since these MRI findings are not unique to pituitary abscess, it is difficult to rely on them alone to distinguish an abscess from a pituitary adenoma or

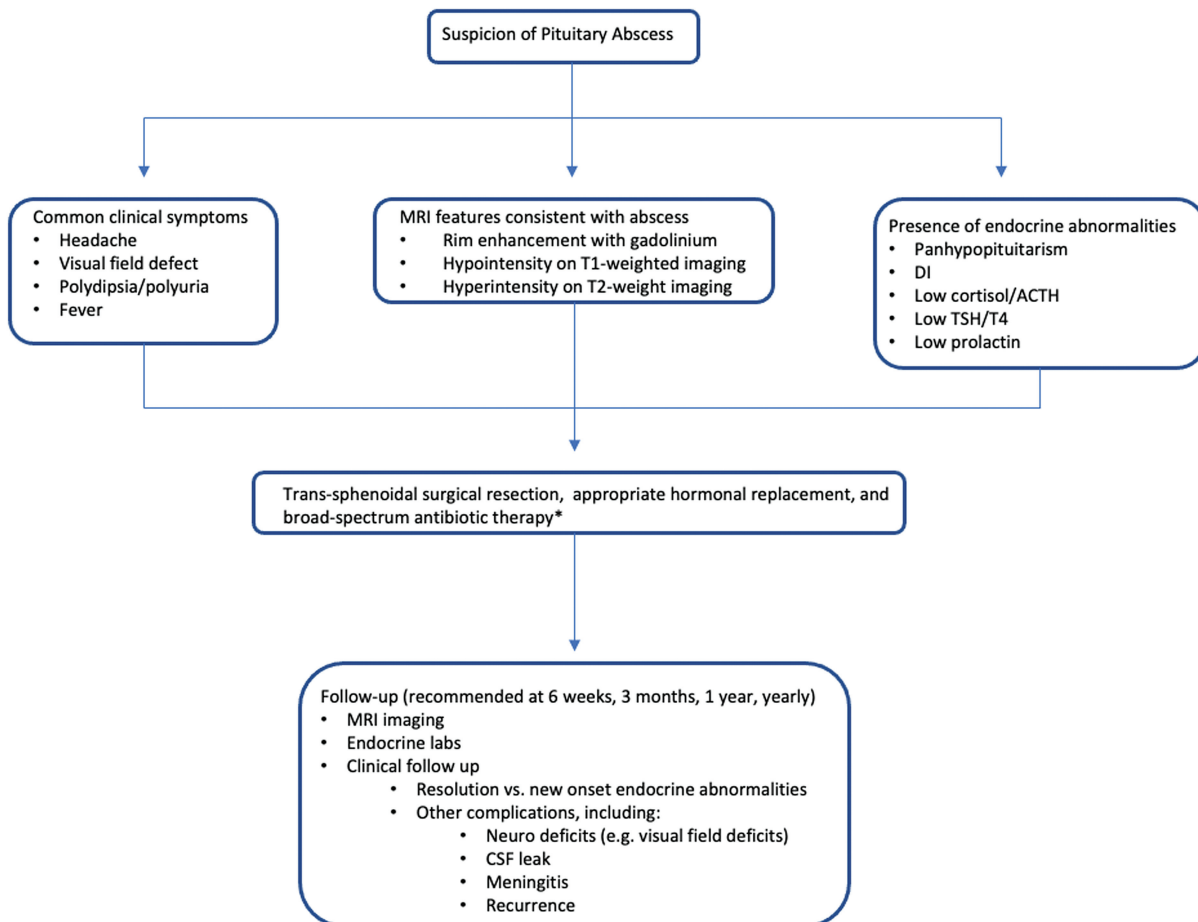


Fig. 3 Algorithm for treatment and follow-up management for pituitary abscess. ACTH, adrenocorticotrophic hormone; CSF, cerebrospinal fluid; DI, diabetes insipidus; T4, thyroxine; TSH, thyroid-stimulating hormone. *Can target antibiotic therapy to culture growth.

from other cystic lesions of the sella, such as Rathke cleft cysts, cystic craniopharyngiomas, and cystic adenomas.² Therefore, the MRI findings are most diagnostically valuable in the context of the clinical presentation.

Management and Follow-Up

Although pituitary abscess is often initially misdiagnosed as pituitary adenoma, as was the case in both patients presented here, surgical resection is the primary treatment option for both entities, with transsphenoidal surgery (TSS) being the recommended approach.^{9,10,12} TSS is safe, effective, and minimally invasive, and it also is associated with minimal to no mortality, morbidity, or complications.^{3,8} Individual case series^{3,9} report the resolution of headaches and visual disturbances in most of their patients after abscess removal. Although some cases may demonstrate resolution of endocrinological abnormalities after surgery, a significant number of patients retain evidence of pituitary hypofunctioning, ranging from 71.4 to 85.2%, and all of those patients subsequently requiring long-term hormone replacement therapy. In both of our patients, clinical symptoms were greatly improved postoperatively, but patient #1 retained DI and patient #2 retained hypopituitarism, both requiring continued medical treatment.

Recurrence of pituitary abscess is uncommon, with Liu et al reporting a rate of 13.3% and Gao et al reporting a rate of 12.1%. In Liu et al's study, three of the four patients who experienced recurrence were middle-aged women with a history of immunological disease, and two of the four patients who experienced recurrence had prior history of pituitary surgery. More follow-up is needed in our cases to confirm the presence, or lack thereof, of recurrence.

A clinical approach to suspected pituitary abscess is summarized in ►**Fig. 3**.

Conclusion

Pituitary abscess is a rare, potentially life-threatening disorder that may be easily mistaken for other sellar lesions. Patients generally present with a subacute to chronic clinical course, with any number of the following symptoms: headache, visual

abnormalities, hypopituitarism, and diabetes insipidus. The presence of a cystic sellar mass on MRI is also very common, and TSS followed by antibiotic therapy is the preferred treatment. In this review, we contribute two additional cases of pituitary abscess to increase awareness of providers and emphasize the importance of accurate diagnosis and proper surgical management.

Conflict of Interest

None declared.

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