Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

A Rare Etiology of Intracranial Space-Occupying Lesion: A Case Report of Pituitary Tuberculosis

Rui Xu
the First Affiliated Hospital of Bengbu Medical University
Jiwei Sun
Department of Neurosurgery, the First Affiliated Hospital of Bengbu Medical University
Dongqi Shao
Department of Neurosurgery, the First Affiliated Hospital of Bengbu Medical University
Yaning Chen
the First Affiliated Hospital of Bengbu Medical University
Bowen Shang
the First Affiliated Hospital of Bengbu Medical University
Chenxi Li
the First Affiliated Hospital of Bengbu Medical University
Henian Li
the First Affiliated Hospital of Bengbu Medical University
Shan Xie
Department of Neurosurgery, the First Affiliated Hospital of Bengbu Medical University
Yu Li
Department of Neurosurgery, the First Affiliated Hospital of Bengbu Medical University
Zhiquan Jiang
bbjiangzhq@163.com

Department of Neurosurgery, the First Affiliated Hospital of Bengbu Medical University

Case Report

Keywords: Pituitary tuberculosis, Sella turcica, Endoscopic endonasal surgery

Posted Date: May 30th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9697502/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background: Tuberculosis is a long-standing infectious disease which caused by Mycobacterium tuberculosis, and tuberculosis affecting the central nervous system is quite uncommon. Although magnetic resonance imaging is widely considered the preferred imaging modality for evaluating pituitary lesions, histopathological examination remains essential for a definitive diagnosis of pituitary tuberculosis.

Case presentation: A 70 - year - old woman had a headache that was 10 days old, had dizziness and had blurred vision in her left eye. Preoperative imaging revealed a soft tissue mass in the intrasellar and suprasellar regions, and this patient underwent endoscopic transnasal resection of the sellar lesion. Postoperative pathology confirmed pituitary tuberculosis.

Conclusion: Pituitary tuberculosis is a rare entity. While preoperative imaging can facilitate the assessment of intrasellar lesions, a conclusive diagnosis ultimately depends on histopathological examination.

Introduction

Pituitary tuberculosis is relatively rare. Central nervous system (CNS) tuberculosis accounts for only 1% of global tuberculosis cases[1, 2], and tuberculous lesions involving the hypothalamic-pituitary region are even rarer[3, 4].

For pituitary tuberculosis, the clinical manifestations are often nonspecific due to the anatomic location of the lesion. Characteristic findings on cranial computed tomography (CT) include nodular enhancing lesions with a central low-density area. On cranial magnetic resonance imaging (MRI), the condition typically presents as focal encephalitis: ill- defined enhancement and edema in the early stage and central low -intensity with peripheral enhancement in the later stage [5–7]. Regardless of clinical presentation or imaging findings, histopathological diagnosis remains essential.

We herein report a case of pituitary tuberculosis treated with endoscopic endonasal surgery.

Case presentation

The patient was a 70 - year - old female who had headaches, dizziness, and visual blurring in the left eye for about ten days. She denied a history of cough or weight loss.

Physical examination: Both pupils were equal, round, and reactive to light, with a diameter of approximately 2.5 mm. Visual acuity was decreased in the left eye, with a corresponding visual field defect. Other physical findings were unremarkable.

Laboratory tests: Cortisol hormone (8 a.m.), free thyroxine, and thyroid stimulating hormone (TSH) were decreased, whereas the afternoon (4 p.m.) cortisol level was elevated (Table 1).

Table 1
Preoperative endocrine evaluation results

Test	Result	Unit	Reference range
Triiodothyronine (T_3)	1.2	ng/ml	0.60–1.55
Thyroxine (T_4)	5.89	μg/dL	4.84–11.72
Free thyroxine (FT_4)	0.46	ng/dl	0.62–1.24
Thyroid-stimulating hormone (TSH)	0.26	uIU/ml	0.30-5.00
Free triiodothyronine (FT_3)	2.86	pg/ml	2.3–4.80
High-sensitivity growth hormone (hs-GH)	0.32	ng/ml	0.003–3.607
Cortisol (8:00 AM)	1.8	μg/dL	6.7–22.6
Cortisol (4:00 PM)	> 60.00	μg/dL	< 10
Prolactin (chemiluminescence)	4.92	ng/ml	Follicular: 3.5–24.2; Ovulation: 3.5–24.2; Luteal: 3.5–24.2; Postmenopausal: 3.1–14.1;
Follicle-stimulating hormone (FSH, chemiluminescence)	9.34	mIU/ml	Follicular:3.3–22.2; Ovulation:3.3–22.2; Luteal: 0.7-5.0; Postmenopausal:21–104;
Luteinizing hormone (LH, chemiluminescence)	2.99	mIU/ml	Follicular: 2.0–12.0; Ovulation: 23–109; Luteal: 1.0–5.0; Postmenopausal:10.9–58.6;
Estradiol (E_2, chemiluminescence)	23.50	pg/ml	Follicular: 22–195; Ovulation:130–459; Luteal: 50–210; Postmenopausal: 3.2–37;
Progesterone (chemiluminescence)	0.26	ng/ml	Follicular: 0.2–1.2; Ovulation: 0.6–2.6; Luteal: 5.8–22.1;

Test	Result	Unit	Reference range
			Postmenopausal: 0.2–0.9;
Testosterone (chemiluminescence)	0.00	ng/dl	Follicular: 4-100; Ovulation: 4-100; Luteal: 4-100; Postmenopausal:4-100;

Imaging examination: Enhanced cranial MRI showed an enlarged pituitary gland with sellar floor depression and a soft tissue mass involving the intrasellar and suprasellar regions. He mass showed hypointensity onT1-weighted imaging and isointensity on T2-weighted imaging, measuring approximately 16 × 17 × 18 mm, with encasement of the right cavernous sinus vasculature. Contrast: Weighted imaging enhanced T1 showed a strong increase in mass. On coronal view, the "belt and suspenders sign" was observed, with the left optic chiasm compressed and elevated (Fig. 1, A and B). Craniocervical computed tomography angiography (CTA) revealed moderate luminal stenosis of the left subclavian artery (L-SA), the M1 segment of the left middle cerebral artery (L-MCA), and the M1 segment of the right middle cerebral artery (R-MCA) (Fig. 1, C). Three-dimensional cranial CT reconstruction revealed a well-defined soft tissue mass in the sellar region, measuring approximately 12 × 11 mm. The adjacent sellar bone showed resorption and thinning. In addition, encasement of the right cavernous sinus adjacent to the mass was suggested.

Based on preoperative findings, the patient was preliminarily diagnosed with a sellar mass. Accordingly, glucocorticoid and thyroid hormone replacement were commenced preoperatively.

Figure 1. Preoperative contrast-enhanced MRI.

1. (A) Sagittal contrast-enhanced T1-weighted imaging shows an enhancing lesion in the sellar and suprasellar region, with loss of normal pituitary architecture and compression of the optic chiasm.
2. (B) Coronal contrast-enhanced T1-weighted imaging shows an enhancing lesion in the sellar and suprasellar region, demonstrating a typical “belt and suspenders” sign, with encasement of the right cavernous sinus.
3. (C) Cranial CT angiography shows varying degrees of vascular stenosis.

For the pituitary lesion, the patient underwent an endoscopic endonasal transsphenoidal resection. A 0.01% adrenaline saline tampon was used to retract the bilateral turbinates and nasal septum, thereby creating sufficient space for endoscopic access. Tumor resection was then carried out using a rigid 30° endoscope with a 4 mm outer diameter (Karl Storz, Tuttlingen, Germany). An incision was made in the nasal septum mucosa approximately 1 cm above the sphenoid sinus opening, allowing the creation of a mucosal flap. After opening the anterior wall of the sphenoid sinus, the sellar floor became visible; this structure was then exposed and opened, revealing pale red lesional tissue. Specimens were collected for subsequent analysis. After the intrasellar tumor had been removed, endoscopic inspection of the sella

revealed tumor invasion into both cavernous sinuses. The lesion was found to be tightly adhered to the right internal carotid artery at the sphenoid sinus segment, where a subtotal resection was performed (Fig. 2). Bleeding was controlled by injecting fluid gelatin (Johnson, New Jersey, USA) into the site. The sellar floor was subsequently reconstructed using artificial dura mater (Tianxinfu, Beijing, China), and no cerebrospinal fluid leakage was observed following the reconstruction.

Figure 2. Endoscopic view during transsphenoidal resection of the pituitary lesion.

1. (A) Elevation of a nasal septal mucosal flap.
2. (B) Drilling of the anterior wall of the sphenoid sinus.
3. (C) Incision of the sellar floor.
4. (D) Intraoperative view of the lesion following dural opening.

On postoperative day 2, follow-up MRI demonstrated postsurgical changes in the sphenoid sinus and sellar region. Postoperative hormonal evaluation revealed no clinically significant abnormalities. Histopathological examination of the resected specimen yielded the following diagnosis: (Sellar region) Microscopic assessment identified a small amount of residual normal pituitary tissue. In addition, scattered foci of small, blue, round cells—characterized by compression, deformation, focal necrosis, interstitial hemorrhage, and extensive infiltration by chronic inflammatory cells—were observed. These findings were accompanied by granulomatous inflammation. Acid-fast staining was negative; however, tuberculosis could not be definitively excluded based on histomorphology alone (Fig. 3). Consultation with Huashan Hospital, Fudan University, rendered the following interpretation: (Sellar region) Granulomatous inflammation with coagulative necrosis—highly suggestive of tuberculous etiology.

Figure 3. Histopathology confirmed pituitary tuberculosis.

Blue arrow: small round blue cells; green arrow: extensive chronic inflammatory cell infiltration; yellow arrow: interstitial hemorrhage.

Further investigations were performed on the patient after the operation. Subsequent comprehensive investigations were undertaken postoperatively. Chest imaging revealed multiple patchy opacities bilaterally, predominantly involving the right upper and middle lobes. The purified protein derivative (PPD) skin test was strongly positive (+++). Sputum smear microscopy for acid-fast bacilli was negative. However, the T-SPOT.TB assay returned positive. Cerebrospinal fluid (CSF), obtained via lumbar puncture, showed normal glucose and protein concentrations, with a mildly elevated chloride level.

The patient initiated a standard four-drug antitubercular regimen—including isoniazid, rifampicin, pyrazinamide, and ethambutol—for two months postoperatively, followed by a seven-month continuation phase with isoniazid and rifampicin.

Clinical symptoms improved progressively during treatment. At one year postoperatively, contrast-enhanced cranial MRI was performed (Fig. 4), revealing stable postsurgical changes within the pituitary gland and no abnormal contrast-enhancing lesions within the residual glandular tissue.

Figure 4. Contrast-enhanced brain MRI obtained 1 year postoperatively.

1. (A) Sagittal contrast-enhanced T1-weighted image shows postoperative changes in the sellar region.
2. (B) Coronal contrast-enhanced T1-weighted image shows postoperative changes in the sellar region, without involvement of adjacent structures.

Discussion and Conclusion

Pituitary tuberculosis was first reported in 1940, with only a few cases described since. It is a rare clinical entity. Pituitary tuberculosis represents about 0.15% of intracranial space-occupying lesions, primarily observed in the Indian region, likely due to the high prevalence of pulmonary tuberculosis in that area [8, 9].

It remains unclear how Mycobacterium tuberculosis reaches the pituitary gland while largely sparing other organs [10]. Possible routes include hematogenous spread or direct extension from basilar tuberculous meningitis. Pituitary tuberculosis often presents with nonspecific symptoms. The most common manifestation is headache. When the mass compresses the dopaminergic pathway, endocrine symptoms such as amenorrhea, galactorrhea, menstrual disorders, or sexual dysfunction may occur. Suprasellar extension frequently results in visual field abnormalities and dysfunction of the hypothalamus. In exceptional instances, pituitary tuberculosis can manifest as pituitary apoplexy [1, 11, 12, 6, 13].

In our study, the patient reported no history of tuberculosis and exhibited no pulmonary symptoms (such as cough or hemoptysis), while the intracranial imaging results were nonspecific. Therefore, pituitary tuberculosis should be differentiated from pituitary adenoma, the most common sellar lesion, as well as from other types of granulomatous pituitary inflammation. CT findings of pituitary tuberculosis usually include a sellar mass, which may extend into the suprasellar region. The lesion is typically isodense or hyperdense on non-contrast CT and demonstrates diffuse, intense enhancement, although atypical features are uncommon [14]. MRI is the main imaging technique used to assess pituitary lesions. Pituitary tuberculosis generally presents as iso - to hypointense on T1 - weighted imaging and hyperintense on T2 - weighted imaging; however, these characteristics are nonspecific and cannot be distinguished from those of pituitary adenomas. However, pituitary adenomas usually do not exhibit peripheral enhancement following the administration of contrast. On contrast - enhanced MRI, pituitary tuberculosis may demonstrate thickening and enhancement of the pituitary stalk. In some cases, rim enhancement, stalk thickening, and dural enhancement are observed [1, 15, 13]. Only a minority of pituitary tuberculosis cases are confined to the sellar region, whereas the majority extend suprasellarly. About one - third of the cases show damage to the sellar floor with infiltration into the sphenoid sinus, and some may also spread to the clivus [1, 13].

Pathological examination is essential for diagnosing pituitary tuberculosis. The lesion is characterized by the presence of epithelioid cell granulomas, Langhans giant cells, and, occasionally, caseous necrosis

[1]. When pathological findings suggest tuberculosis, confirmatory testing—such as tuberculin skin testing, M. tuberculosis PCR, or QuantiFERON-TB Gold—is unnecessary [14].

Common surgical approaches for pituitary lesions include the transsphenoidal approach, stereotactic biopsy, frontotemporal craniotomy, and transsylvian approach [16]. The main goals of surgery are to obtain a tissue diagnosis and relieve pressure. In cases where patients have a substantial suprasellar component, the subfrontal approach might be utilized. Nevertheless, craniotomy poses a risk of contamination of cerebrospinal fluid. In contrast, minimally invasive surgery plays a crucial role in preventing contamination of cerebrospinal fluid by Mycobacterium tuberculosis [3, 17]. Meanwhile, the transsphenoidal approach avoids complications associated with conventional neurosurgical incisions, such as skin incisions, facial bone flaps, or brain retraction. Furthermore, studies have shown that endoscopic endonasal surgery is associated with significant improvements in long-term postoperative pain and emotional status [18].

In our case, preoperative MRI did not show specific features of pituitary tuberculosis. The patient underwent endoscopic endonasal transsphenoidal resection of the pituitary lesion. Histopathological analysis demonstrated granulomatous inflammation accompanied by caseous necrosis in the sellar region, which is consistent with tuberculosis. The diagnosis was confirmed by additional testing for *Mycobacterium tuberculosis*, and anti-tuberculosis treatment was initiated.

Treatment of pituitary tuberculosis involves bactericidal drugs with effective blood-brain barrier penetration, including isoniazid, rifampin, pyrazinamide, and streptomycin [19]. It is advisable to monitor hormone levels after surgery, and to administer hormone replacement therapy when necessary. Clinical and imaging findings should be used to guide anti - TB medication modifications.

In the left eye, the patient had blurred vision, headaches, and dizziness before receiving surgery. Following preoperative evaluation confirming no contraindications, endoscopic endonasal transsphenoidal lesion resection was performed, and intraoperative specimens were obtained. After a postoperative diagnosis of pituitary tuberculosis, anti – tuberculosis therapy was promptly commenced. The patient adhered to the prescribed anti-tuberculosis regimen and achieved a favorable outcome. After one year of follow –up, the cranial MRI revealed no signs of recurrence. Regular follow-up was recommended, and the patient was advised to seek prompt medical attention if symptoms recurred.

Abbreviations

CNS: central nervous system

CT: computed tomography

MRI: magnetic resonance imaging

CTA: computed tomography angiography

Declarations

Ethics approval and consent to participate

Consent for publication

Written informed consent for publication of this case report was obtained from the patient.

Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests

Funding

This case report was supported by the Key Project of Anhui Provincial Health Commission (No. AHWJ2023A10099). The funders had no role in the study design, the decision to publish the article, or preparation of the manuscript.

Authors' contributions

R.X., J-W.S., D-Q.S., Y-N.C., B-W.S., C-X.L. and H-N. L conceived the framework of this article and collected the data. R.X., J-W.S. wrote the manuscript. S.X. and Y.L. interpreted and analyzed the data. Z-Q.J. revised the manuscript. All authors read and approved the final version of the manuscript.

Acknowledgements

The authors thank the neurosurgery team for their assistance in data collection.

Clinical trail number: no applicable.

References

1. Srisukh S, Tanpaibule T, Kiertiburanakul S, Boongird A, Wattanatranon D, Panyaping T, Sriphrapradang C. Pituitary tuberculoma: A consideration in the differential diagnosis in a patient manifesting with pituitary apoplexy-like syndrome. IDCases. 2016;5:63–6.
2. Ben Abid F, Abukhattab M, Karim H, Mohamed A, Al-Bozom I, Ibrahim WH. Prim Pituit Tuberculosis Revisit Am J Case Rep. 2017;18:391–4.
3. Prabha BB, Rangachari V, Subramaniam V, Gopan TV. Baliga. Pituitary Tuberculoma Masquerading as a Pituitary Adenoma: Interesting Case Report and Review of Literature. Asian J Neurosurg.

2021;16:141–3.

4. Shefin SM, Rubaiya A, Kamal M. Sarkar. A case report on pituitary tuberculosis. Bangladesh J Med Sci. 2024;23:864–8.
5. Smitesh GG, Mannam P, Kumar V, George T, Murugabharathy K, Prakash TV, Yadav B. Sudarsanam. Absence of posterior pituitary bright spot in adults with CNS tuberculosis: A case-control study. PLoS ONE. 2022;17:8.
6. Ayyappan Kutty S, Mohammad Kamel Aljasem N, Shankar A. Shahane. Intrasellar Tuberculosis Presenting as Pituitary Apoplexy: A Case Report. Cureus. 2024;16:e75378.
7. Guennouni A, Bahha S, Bahlouli NH, Allali N, Chat L. El Haddad. Imaging Contribution to the Diagnosis of Neuro-Meningeal Tuberculosis and Tuberculous Hypophysitis: A Case Report. Sage Open Pediatr. 2025;12:5.
8. Navarro-Flores A, Fernandez-Chinguel JE, Pacheco-Barrios N, Soriano-Moreno DR. Pacheco-Barrios. Global morbidity and mortality of central nervous system tuberculosis: a systematic review and meta-analysis. J Neurol. 2022;269:3482–94.
9. Tayal N, Joshi S, Vaish M, Bhatia A. Primary pituitary tuberculosis: A rare clinical entity. Lung India. 2023;40:93–5.
10. Gupta PK, Pandey S, Pandey D. Pituitary Tuberculoma: An Uncommon Pathology. Indian J Neurosurg. 2021;10:77–9.
11. Zia-Ul-Hussnain HM, Farrell M, Looby S, Tormey W, Javadpour M, McConkey S. Thompson. Pituitary tuberculoma: a rare cause of sellar mass. Ir J Med Sci. 2018;187:461–4.
12. Kumar T, Nigam JS, Jamal I, Jha VC. Primary pituitary tuberculosis. Autops Case Rep. 2021;11:e2020228.
13. Krishnan G, Makhatar NHM, Ching TH. and S. Khoo. Primary pituitary tuberculoma with a pituitary apoplexy-like presentation. Endocrinol. Diabetes Metab. Case Rep. 2024; 2024: 6.
14. Derbel S, Tahri A, Assarrar I, Rouf S, Latréch H. A pituitary mass is not always an adenoma: A rare case of pituitary tuberculoma in an adolescent. Int J Surg Case Rep. 2024;114:6.
15. Khan AA, Ahuja S, Malik S, Naaz S. Zaheer. Pituitary tuberculoma with panhypopituitarism masquerading as a pituitary adenoma. Neuropathology. 2023;43:496–9.
16. Djoubairou BO, Gazzaz M, Hammi S, Bouya SM, Salami M. El Mostarchid. Panhypopituitarism revealing sellar tuberculoma. Ann Endocrinol. 2015;76:286–8.
17. Gierlotka A, Sordyl R, Bielecki I, Mandera M. Pituitary tuberculosis in the pediatric population: a systematic review and case report. Pituitary. 2025;29:9.
18. Neiderman NNC, Kaufman S, Bilaus R, Wengier A, Baran TZ, Abergel A. Long-Term Quality of Life Among Patients Undergoing Endoscopic Pituitary Gland Surgery. J Clin Med. 2024;13:17.
19. Rochtus A, Lagae L, Jansen K, De Somer L, Vermeulen F. and F. de Zegher. Reversible hypothalamic obesity in a girl with suprasellar tuberculoma. Horm. Res. Paediatr. 2024; 97: 165–171.

Figures

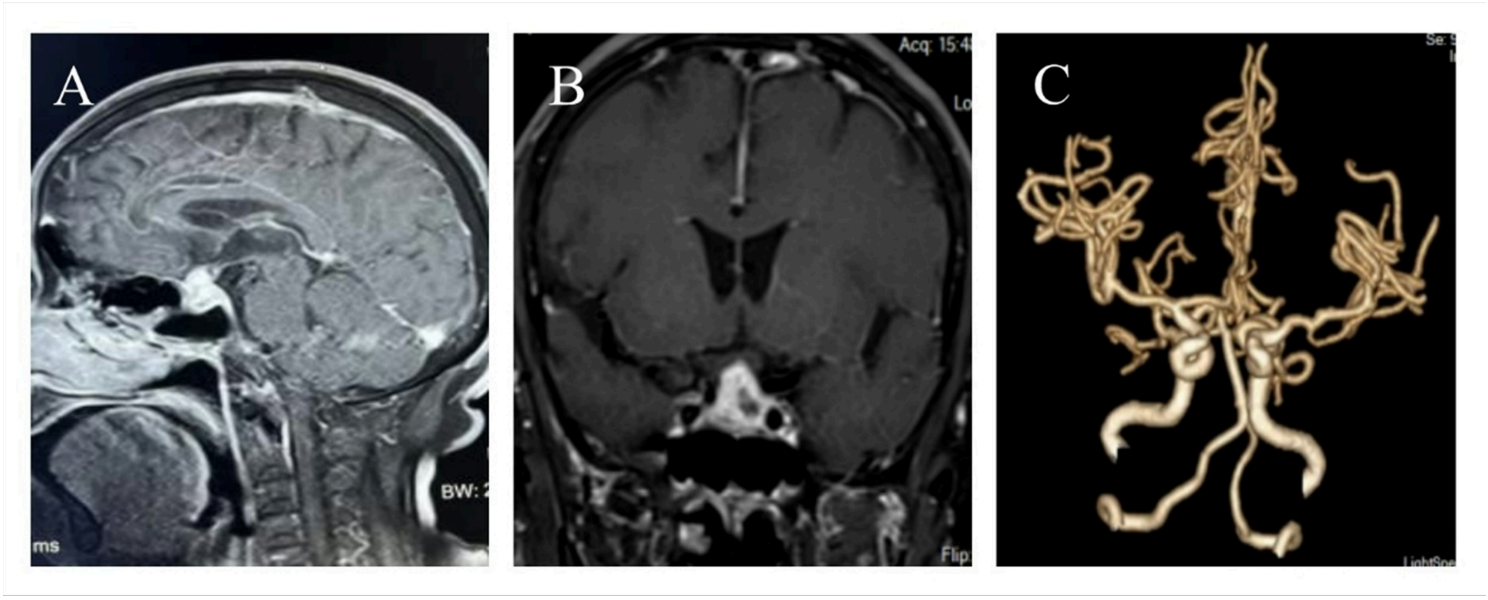


Figure 1

Preoperative contrast-enhanced MRI.

(A) Sagittal contrast-enhanced T1-weighted imaging shows an enhancing lesion in the sellar and suprasellar region, with loss of normal pituitary architecture and compression of the optic chiasm.
(B) Coronal contrast-enhanced T1-weighted imaging shows an enhancing lesion in the sellar and suprasellar region, demonstrating a typical “belt and suspenders” sign, with encasement of the right cavernous sinus.
(C) Cranial CT angiography shows varying degrees of vascular stenosis.

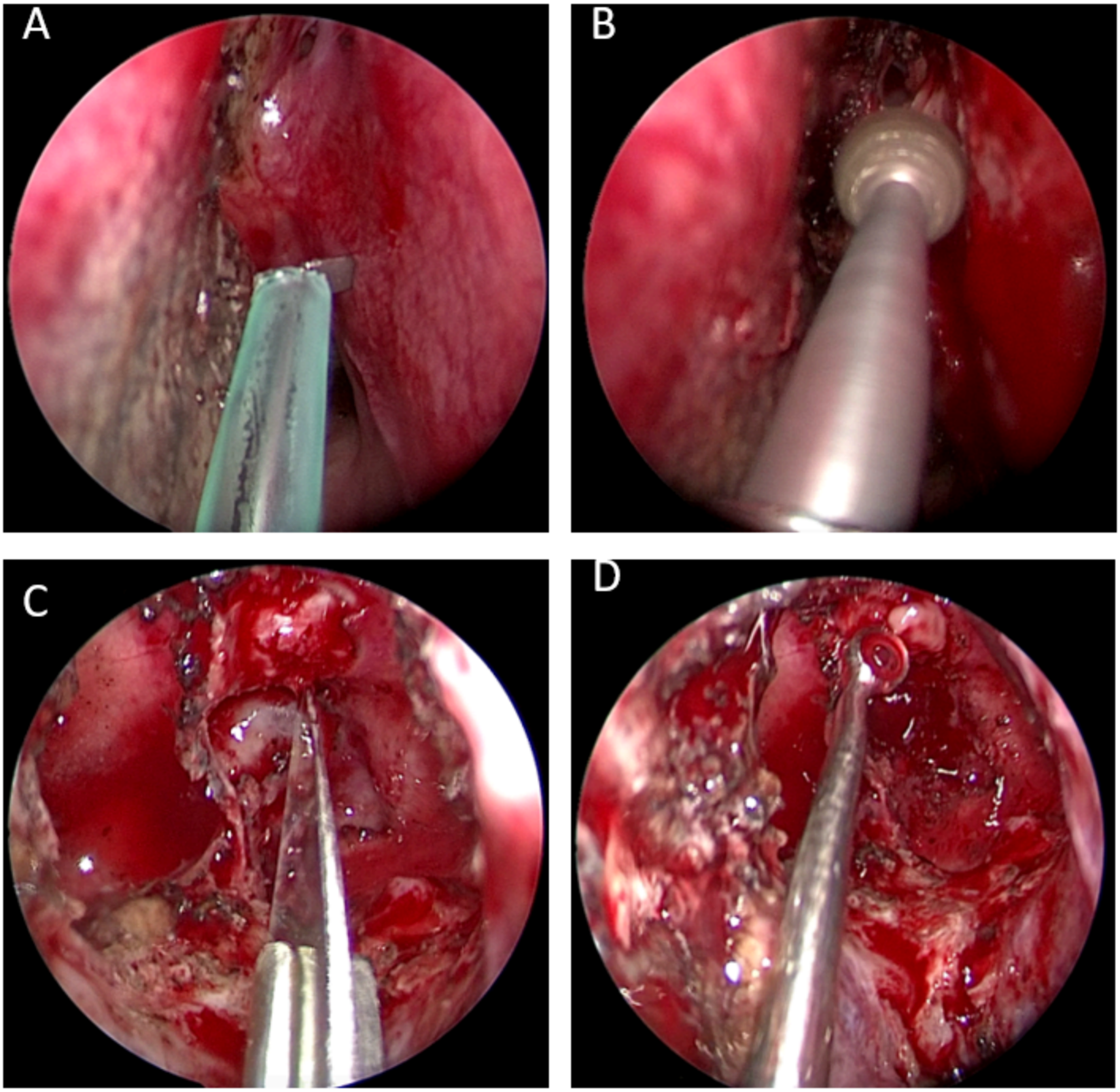


Fig. 2.

Figure 2

Endoscopic view during transsphenoidal resection of the pituitary lesion.

(A) Elevation of a nasal septal mucosal flap.
(B) Drilling of the anterior wall of the sphenoid sinus.
(C) Incision of the sellar floor.
(D) Intraoperative view of the lesion following dural opening.

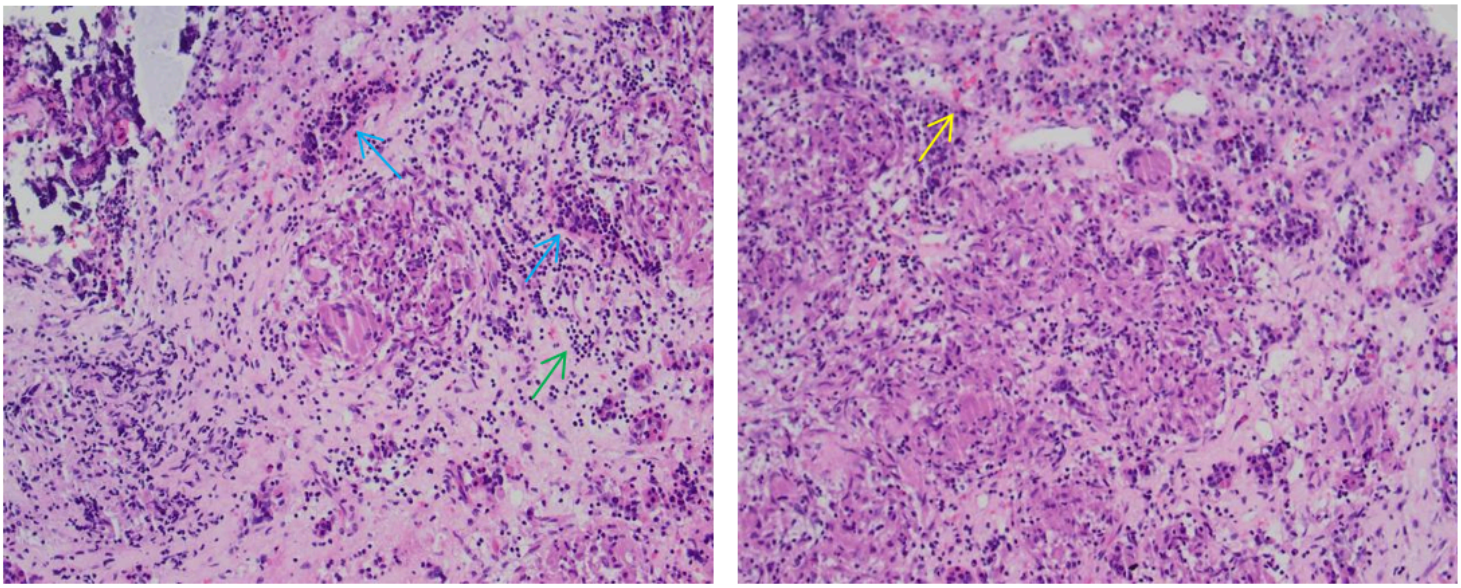


Fig. 3.

Figure 3

Histopathology confirmed pituitary tuberculosis.

Blue arrow: small round blue cells; green arrow: extensive chronic inflammatory cell infiltration; yellow arrow: interstitial hemorrhage.

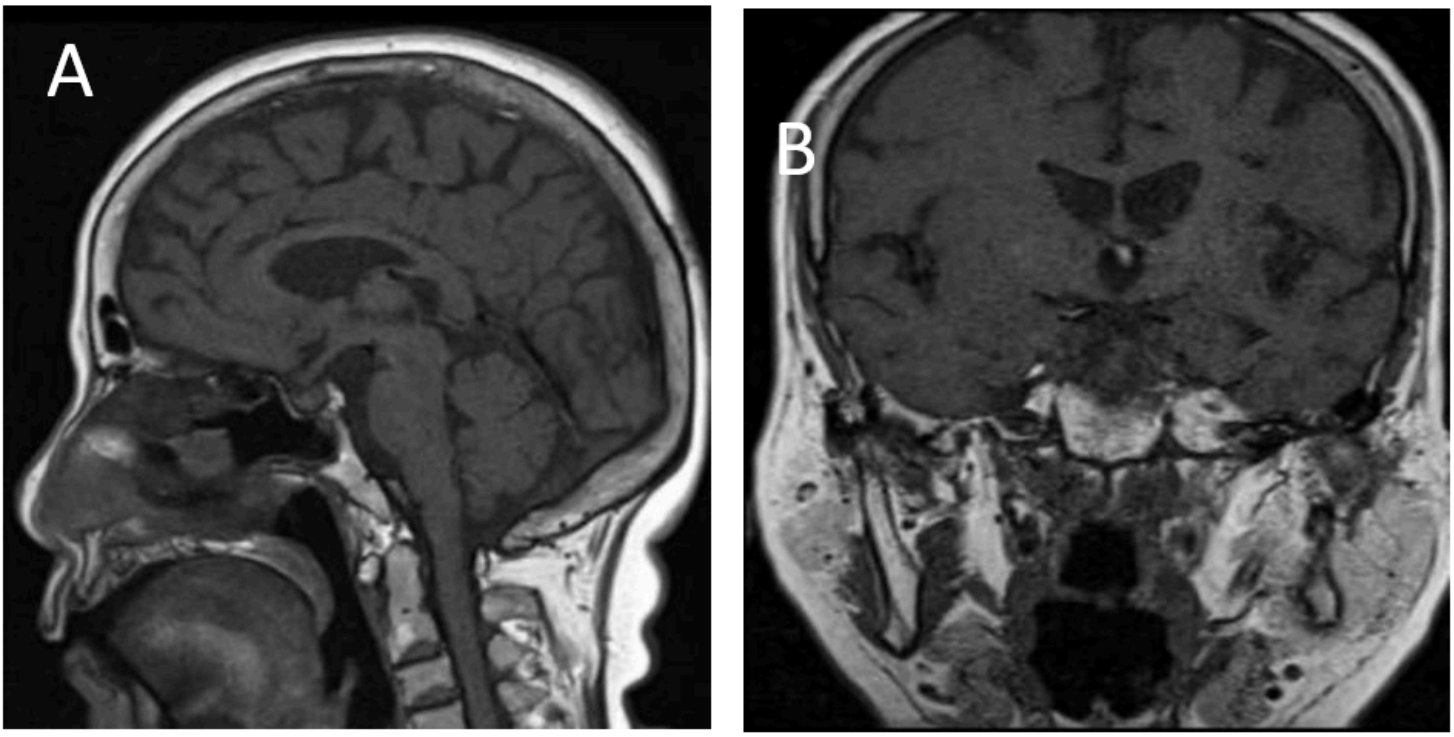


Fig. 4.

Figure 4

Contrast-enhanced brain MRI obtained 1 year postoperatively.

(A) Sagittal contrast-enhanced T1-weighted image shows postoperative changes in the sellar region. (B) Coronal contrast-enhanced T1-weighted image shows postoperative changes in the sellar region, without involvement of adjacent structures.