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CASE REPORT AND LITERATURE REVIEW

Pituitary abscess: Report of four cases and review of literature

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Abstract Pituitary abscess is a rare disorder and its presenting manfestations are non-specific therefore, the diagnosis is usually made either postoperatively or at postmortem. We describe four such cases seen over a period of 10 years. All the patients presented with fever, systemic signs of toxaemia and endocrine dysfunctions. Two of them had pre-existing pituitary pathology. A preoperative diagnosis of pituitary abscess was considered in all in view of characteristic MR findings. Three patients underwent transsphenoidal drainage of abscess, whereas the remaining one succumbed to sepsis and was diagnosed at necropsy. Offending organisms including *Pseudomonas, Acinetobacter* and *Staphylococcus* were isolated in three cases respectively. During follow-up for 4 years, 2 patients are doing well, one had a recurrent abscess after 1 year and required redo-surgery.

Key words Hypopituitarism · Pituitary abscess · Toxaemia

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Introduction

Pituitary abscess is a rare disorder characterized by systemic signs of toxaemia, mass effects due to enlarging pituitary and/or associated endocrine dysfunctions. The disease could occur denovo in normal pituitary tissue or sometimes with underlying pituitary pathology [1–4]. The infection usually extends from paranasal sinuses, whereas involvement of the pituitary gland in systemic sepsis is quite rare because of effective blood brain barrier. The disorder is quite rare as evidenced by few hundred cases have been reported in the literature in last century and most of these are as a case report. In majority of instances diagnosis of pituitary abscess was made postoperatively or at necropsy. Out of 1060 cases of patients with pituitary pathology during last 10 years at our center, more than 95% being pituitary tumors, only 4 patients were found to have pituitary abscess. The diagnosis of pituitary abscess in our patients was considered preoperatively due to characteristic MR imaging and increasing awareness. We describe these cases with brief review of literature.

Patients and methods

We reviewed the clinical, hormonal and imaging findings including bacteriology of 4(0.4%) patients with pituitary abscess out of 1060 cases of pituitary adenomas and other sellar pathology seen at a tertiary care center from north India between 1996–2005. Three patients were male and their

Table 1. Clinical characteristics of four patients with pituitary abscess

Case No	Age (yrs)/ Sex	Presenting complaints	Predisposing Factor	Hormonal dysfunction at presentation	Micro-organism	Pathology	Postoperarive hormonal dysfunction	Outcome	Duration of Follow-up
1	27/M	Fever, headache, blurring of vision	Not Identified, De novo	↓ACTH ↓TSH	None	Acute and chronic inflammation, amorphous eosinophilic material	GH	Improved	4 Yrs
2	35/M	Fever, headache, vertigo	Lobar pneumonia, De novo	↓ACTH ↓TSH ↓LH, FSH	Pseudomonas	Acute abscess	–	Died	–
3	28/M	Fever, loss of vision, worsening of preexisting headaches	Tumor necrosis	↓ACTH ↓TSH ↓GH ↓LH, FSH	MRSA	NFPT with tumor, necrosis, acute abscess	ACTH, TSH, LH, FSH, GH	Improved	4 Yrs
4	12/F	Fever, headache	Rathke's cleft cyst secondarily infected	↑PRL	Acinetobacter. Staphylococcus	Acute abscess, extensive fibrosis of abscess wall	GH	Improved	4 Yrs

M = Male; F = Female; MRSA = Methicillin resistant *Staphylococcus aureus* NFPT = Nonfunctioning pituitary adenoma, ↓ = Decreased, ↑ = Increased, PRL = Prolactin

mean age was 25 years (range 12–35 years). All patients were diagnosed to have pituitary abscess based on the following criteria(s) (a) a triad of mass effect in the pituitary area, fever and typical MRI findings (b) drainage of pus with or without isolation of organisms, and (c) evidence of acute inflammation and abscess wall on histopathology. Preoperatively baseline pituitary hormones were assessed in all patients. Three patients underwent transsphenoidal surgery and one of them required transfrontal approach later due to recurrent abscess. In remaining one patient pituitary surgery could not be performed due to overwhelming sepsis and disseminated intravascular coagulation (DIC) and the diagnosis was confirmed at autopsy. Postoperatively (after 6 months to 4 years) these patients were subjected to assessment of pituitary reserve by combined pituitary stimulation test (insulin hypoglycemia, GnRH test) and MR imaging.

Case-1

A 21-year male was admitted with fever and headache for 2 weeks associated with decrease in vision in the right eye for seven days duration. He did not have history of sinusitis, otitis media or any other septic process. He received cefotaxime for 7 days prior to admission. On examination, he had normal sensorium without any meningeal signs. His pulse was 100/min regular and BP 110/70 mmHg. Visual acuity was 6/60 and 6/18 in the right and left eye respectively and computerized perimetry showed profound loss of vision confirming a right temporal field defect. He had no papillodema, optic atrophy or any other neurodeficit. On investigation, total leukocyte count was 10,500/cumm with 68% neutrophils and serum biochemistry was normal. Serology for HIV was negative and CSF examination was noncontributory. Hormonal profile was: serum T_3 0.84 ng/ml (N1.8–2.1), T_4 4.1 μg/dl (N5.5–13.5), TSH 2.35 μIU/ml (N,1.17–5.3), prolactin 16 ng/ml (N5–25), cortisol (0800 h) 210 nmol/L (N400–550), LH 5.5 mIU(ml (N5–15), FSH 7.2 mIU/ml, (N 5–15) and testosterone 9.8 nmol/L (N9–27) and urine and serum osmolality were normal. MR imaging of the hypothalamo-pitutiary area on T1WI revealed a 3 × 2.5 × 2 cm sellar mass with suprasellar extension, with central hypointense area and peripheral rim enhancement on contrast (Fig. 1(a) and (b)) . Paranasal sinuses and cavernous sinus areas were normal. A diagnosis of pituitary abscess was considered. Transsphenoidal surgery drained 15 ml of pus which was sterile and smear was negative for bacteria, acid-fast organism and fungi. Sphenoid mucosal biopsy was normal and histopathology of the pituitary lesion demonstrated abscess wall with extensive degenerative changes and infiltration by lympho-plasmacytoid cells, polymorhphs and eosionphils(Fig. 2(a) and (b)). There was no evidence of amyloid or tumor tissue and immunofixation for

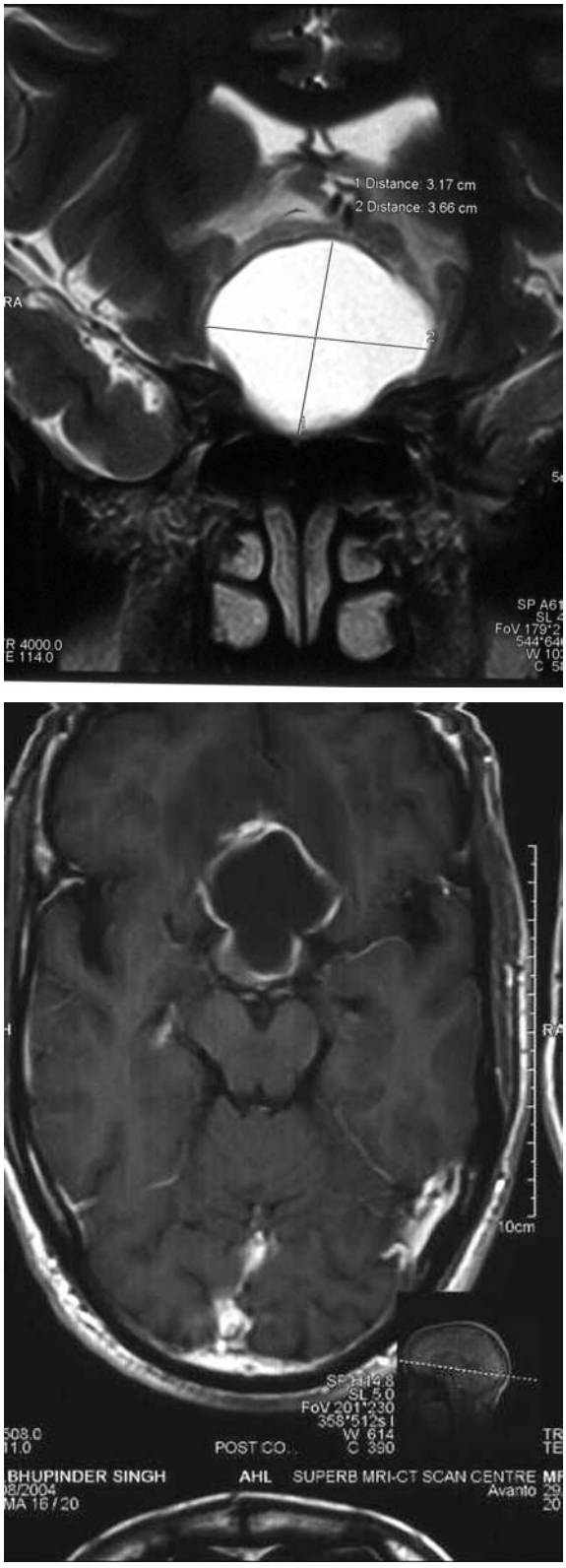

Fig. 1 **(a)** T2 weighted coronal section shows the abscess cavity as hyperintense area. Oedema around the lesion can be noted in the suprasellar brain parenchyma, (**b**) T1 post contrast axial section shows low signal intensity of abscess with peripheral rim enhancement

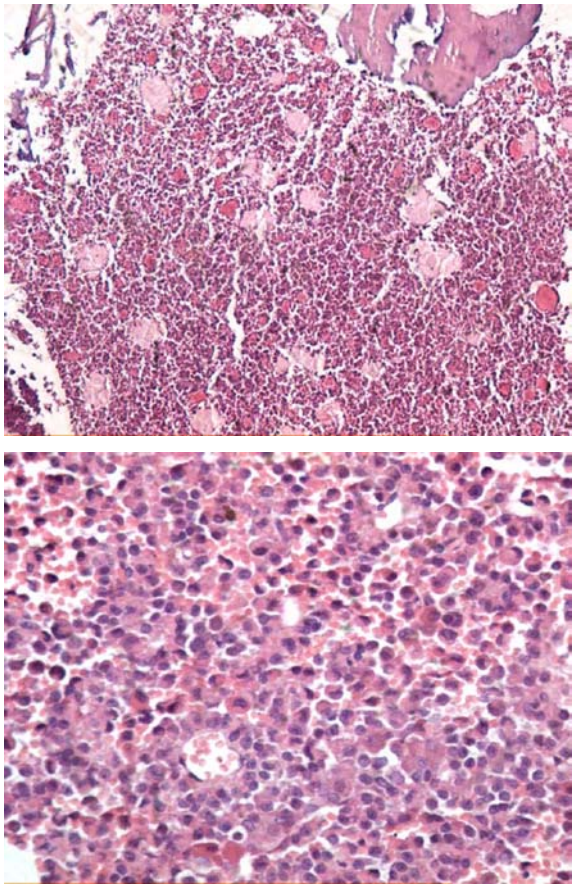

Fig. 2 **(a)** Low power photomicrograph showing densely populated acute neutrophilic infiltrates destroying the parenchyma (H & E 4x), **(b)** Sheets of inflammatory cell rich in plasma cells and polymorphs(x10)

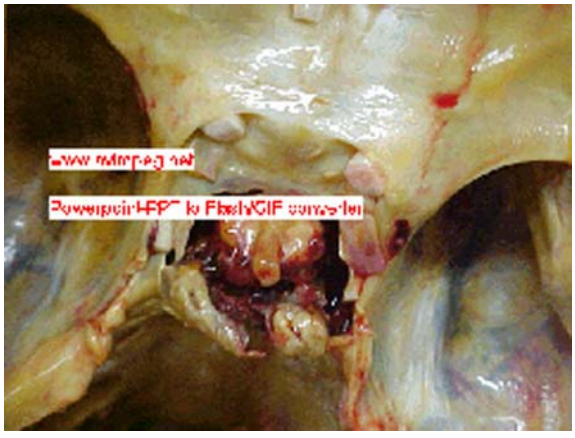

Fig. 3 The pituitary fossa at necropsy showing the abscess (pus oozing out)

λ and κ chain were noncontributory. He received ceftriaxone and metronidazole for 6 weeks with hydrocortisone and L-thyroxine replacement. With this treatment, vision improved dramatically to 6/18 and 6/6 in the right and left eye respectively. At one year of follow up, repeat imaging did not reveal any abnormality and presently he is only growth hormone deficient.

Case 2

A 35-year-old soldier presented with sudden onset of fever, throbbing headache and vertigo. Within 4 days, he developed recurrent vomitings and altered sensorium. On examination, he did not respond to verbal commands, had incoherent speech and bilateral papilloedema. He had evidence of tachycardia, hypotension (90/70 mmHg) and right lower zone consolidation. Investigations revealed leukocytosis, plasma glucose 42 mg/dl, and serum sodium 105 mEq/L (N 128–140). CSF analysis was suggestive of parameningeal focus of infection. He was hypothyroid, hypocortisolic, hypogonadal and had decreased prolactin levels. Blood culture grew *Pseudomonas* species. MRI revealed enlarged pituitary gland with central hypointensity and peripheral rim enhancement. MR venography revealed cortical vein thrombosis. He was managed with ceftazidime, amikacin, 3% saline, glucocorticoids, L-Thyroxine and ventilatory support. He had progressively downhill course with deranged liver functions and features of D1C, therefore, pituitary surgery could not be performed. Despite all measures he succumbed to his illness. Autopsy confirmed denovo pituitary abscess (Fig. 3) with cavernous sinus thrombosis.

Case 3

A 27-year-old man was admitted with a history of headache and progressive decrease in visual acuity of 7 years duration. He had fever, headache and deterioration of vision for last 2 weeks. At the time of presentation he was febrile, had tachycardia, with blood pressure of 110/70 mm of Hg. In the right eye perception of light was absent and on left side he was able to count fingers at two metres distance. Optic fundii were bilaterally pale; right being more than the left. Rest of the systemic examinations were normal. Hemogram and biochemical profile were normal. CSF analysis showed a lymphocytic pleocytosis with hypoglycorrhoecia. He was hypothyroid, hypocortisolic and hypogonad. MR imaging of the hypothalamo-pituitary area revealed $3 \times 2.5 \times 2.5$ cms sellar mass having hypointense center with peripheral rim enhancement on contrast. Transsphenoidal aspiration from the lesion grew methicillin resistant *Staphylococcus aureus* and histopathology showed pituitary adenoma with areas of necrosis and superadded acute abscess formation. Repeat MR imaging revealed cavity filled with blood which was consistent with postoperative changes. At 4 years of follow-up patient is doing well and is on L-thyroxine, hydrocortisone and testosterone replacement therapy.

Case 4

A 12-year girl presented with fever and headache of 2 months duration associated with diminution of vision in

Table 2. Summary of MR imaging of four patients with pituitary abscess

Sr. No	Pre Operative MRI				Post Operative				Comments
	Size	T1	T2	CEMR	Size	T1	T2	CEMR	
1	3 × 2.5 cms	Hypointense Few hyperintense areas	Hyperintense	Ring enhancement	2 × 1 cms	Isointense small residual left para and infresellar collection	Hypointense	No enhancement	Residual fluid collection
2	2.5 × 2.7 cms	Hypointense	Hyperintense	Ring enhancement		Died			
3	3.3 × 3.0 cms	Hypo, iso and hyperintense	Hyperintense	Variable enhancement	1.2 × 1.3 sellar and suprasellar	Hyperintense	Isointense	None	Residual hemorrhage
4	2.8 × 2.2 cms	Predominant hypointensity	Heterogenously hyperintense	Ring enhancement	3 × 1.5	Hyperintense	Hypointense	Mild peripheral enhancement	Residual abscess

both eyes. On examination, she had bitemproral hemianopia, right optic atrophy and visual acuity of 6/24 and 6/12 in the right and left eye respectively. Other systemic examination was normal. On investigations, hemogram, biochemistry and hormonal profile (except hyperprolactinemia) were normal. MRI of the hypothalamo-pituitary area revealed $2.8 \times 2.2 \times 2.3$ mass which was hypointense on T1 and hyperintense on T2WI with variable enhancement on contrast(Fig. 4(a) and (b)). Right frontotemporal craniotomy was performed and thick purulent yellowish fluid from sellar area was aspirated and culture of that grew A*cinetobacter and Staphylococcus species*. The histopathology of the resected specimen showed fibrocollagenous tissue with degenerative changes. There was no evidence of craniopharyngioma or pituitary adenoma. She received appropriate antibiotics for 6 weeks. Her vision improved to 6/12 and 6/6 in right and left eye respectively at discharge. One year later she presented with reccurrence of headache, visual deterioration but no fever. She was euhormonal. Repeat MRI revealed a residual sellar organised abscess with suprasellar extension. Re-drainage of pus with removal of abscess wall was performed, histopathology of that was suggestive of Rathke's cleft cyst. At 4 years of followup, she is euhormonal, her vision is normal and had no residual lesion.

Discussion

Three of our patients are young adults and one was in the paediatric age group. All our patients had fever, evidence of mass effects in form of headache, visual symptoms and hormonal dysfunctions. This type of classical picture is infrequently described in literature previously [1, 2]. However, triad of fever, meningism and leukocytosis suggestive of pituitary abscess was present only in one of our case. Peculiarly in all of our patients symptoms related to pituitary abscess was presenting feature of pituitary pathology be it denovo or secondary to underlying pituitary disease.

Pituitary abscess like any other sellar or suprasellar pathology can produce hormonal hypofunctions as a result of destruction of the gland and sometimes hyperprolactinemia due to stalk compression. All of our patients had hypopituitarism and only one had hyperprolactinemia . In the largest series by Vates, more than 50% of patients had panhypopituitarism at presentation, 10% had new onset hypopituitarism after surgery and only one had isolated hyperprolactinemia [2]. Unlike the previously described cases none of our patients had diabetes insipidus either at onset or after surgery [2,5].

Pituitary abscess can occur denovo in an otherwise "normal" pituitary gland (70%) or in a preexisting pituitary pathology (30%) [2, 4]. Amongst the space occupying lesions pituitary adenomas, Rathke's cleft cyst and cranio-

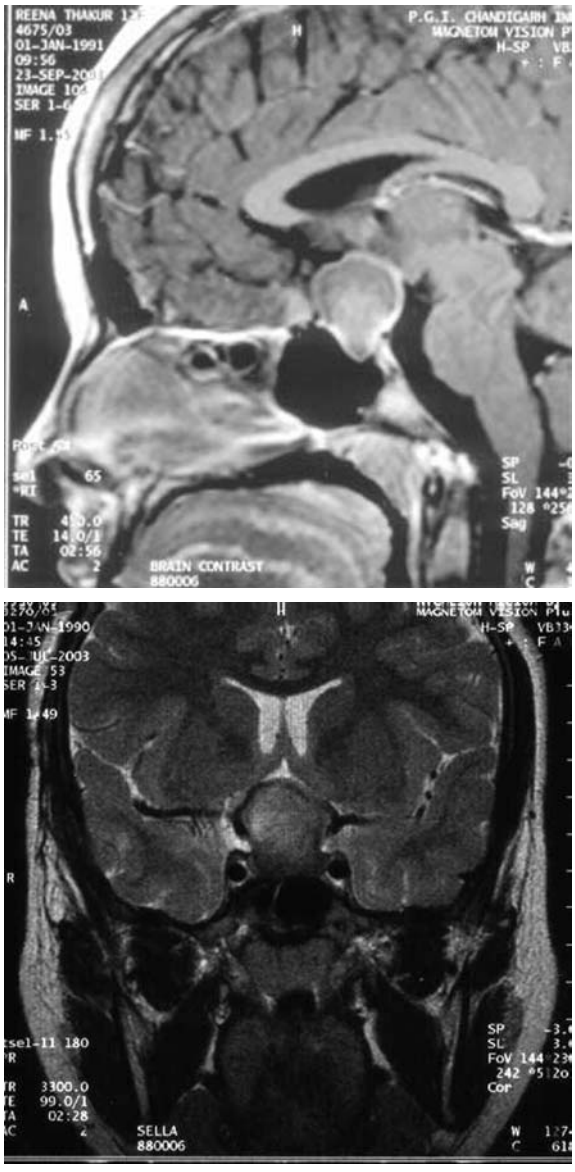

Fig. 4 **(a)** Saggital T1 post contrast image shows mixed low and high signal within the infected cyst due to hemorrhage. The rim of the lesion shows enhancement, **(b)** Contrast T2 image shows mixed high and low signal due to hemorrhagic contents and a hypointense capsule of the lesion

pharyngioma are the important ones [6–8]. In two of our patients the abscess occurred denovo in otherwise normal pituitary gland, in remaining two one each had necrotic nonfunctioning pituitary adenoma and Rathke's cleft cyst. Pituitary abscess is caused either by unidentified bacteremia, septic thrombophlebitis of cerebral venous sinuses or a contaminated cerebrospinal fluid fistula. One of our patient had evident source of sepsis in form of bacterial pneumonia and other had cavernous sinus thrombosis.

In previously reported cases, whole spectrum of microbiological agents have been described, including Gram-positive cocci (50%), Gram-negative bacilli, fungi, amoebae and yeast [2, 4, 9–11]. However, in majority of cases organisms could not be isolated and the diagnosis was based on other circumstantial evidences [2, 12]. This may be due to prior antibiotic therapy or fastidious organisms. In three of our patients organisms could be isolated including *Pseudomonas, Acinetobacter and Staphylococcus*.

The advent of CT and MRI has improved the diagnostic sensitivity to detect pituitary abscess. However, radiological differentiation of intramural pituitary abscess from pituitary apoplexy is difficult. [13, 14]. The signal intensity of an abscess may be affected by its protein content or the presence of hemorrhage, and contrast enhancement may also be variable and difficult to interpret [14]. This happened in two cases. Both of them showed various intensities on T1-weighted images and had a sharply demarcated area of hypo-and hypertensity. Interpretation is more challenging in presence of concurrent pituitary pathology or postoperative changes in a patient who has undergone previous surgery for pituitary disease. This situation was faced in follow-up imaging in 2 patients (# 3 and 4). One had bleeding into the residual tumor tissue after surgery and was confused as residual abscess, however repeat imaging showed disappearance of that. In other case it was infected Rathke's cyst. It has been suggested that in this situation a tagged WBC nuclear scan may improve the specificity [13, 14]. The peripheral rim enhancement on contrast MR, represents either residual pituitary or an abscess capsule. Three of our patients showed this pattern. However, majority of adenomas will have more solid enhancement as opposed to thin rim in case of an abscess [14]. Presence of air fluid level, meningeal enhancement, cerebritis, sphenoid sinus effusion or destruction of its floor, absence of posterior pituitary bright spot, cavernous sinus thrombosis are supportive towards an abscess [15, 16].

Histopathological evaluation is essential for the diagnosis of pituitary abscess. It is characterized by presence of abscess wall infiltrated by polymorphonuclear leukocytes or macrophages with underlying necrosis as seen in our patients [17]. However, one patient had atypical lymphoplasmacytoid cells infiltration. This can occur in subacute or chronic abscesses. Negativity for congored staining and exclusion of monoclonality by λ and κ-chain immunostaining virtually ruled out plasma cell dyscrasia.

Early surgical drainage is the standard treatment of pituitary abscess to decompress mass effects, prevent secondary hypopituitarism and to distinguish it from other mimicking lesions [2, 4, 12, 17–19]. The transsphenoidal approach is strongly recommended, craniotomy is appropriate if the abscess is exclusively suprasellar or insignificant evacuation is contemplated. However, it is rarely used because of theoretical fear of contamination of CSF space. This was adopted only in one of our patient as she had recurrence with large suprasellar component. Following drinage, 4–6 weeks of parenteral antibiotics is recommended by various

authors. The mortality rate in our small series was 25% and this occurred due to delay in the diagnosis and associated DIC. Postoperative improvement in visual symptoms and endocrine functions is quite impressive in patient with pituitary abscess who had de-novo as compared to those who had underlying pituitary pathology.

In conclusion, pituitary abscess is a rare entity but the diagnosis should be suspected if there is triad of sepsis, mass effects due to pituitary enlargement and rim enhancement on MR imaging. Early surgical intervention is rewarding.

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