

## PITUITARY ABSCESS MIMICKING PITUITARY ADENOMA: A REVIEW OF THREE CASES SEEN AT THE PHILIPPINE GENERAL HOSPITAL FROM 2004-2007

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### ABSTRACT

**Synopsis:** Pituitary abscesses are rare but potentially life-threatening disorders. Headaches, pituitary insufficiency and visual disturbances are the most common clinical manifestations mimicking pituitary adenoma.

**Clinical Presentation:** We report 3 patients with pituitary abscesses at the Philippine General Hospital since 2004. Case 1 is a 24 year-old male with a 2-year history of severe generalized headache, blurring of vision, and hypothyroid symptoms. Case 2 is a 42 year-old woman admitted due to severe generalized headache, amenorrhea and polyuria of 3 months duration. Case 3 is a 37 year-old female with a 3-year history of headache and amenorrhea.

**Physical Examination:** Case 1 was a stunted, morbidly obese (BMI of 36kg/m<sup>2</sup>) myxedematous patient, with no thyromegaly, and coarse skin, absence of body hair and hypoactive reflexes. His visual acuity was light perception on the left eye and 20/70 on the right eye. Case 2 was normal except for bitemporal hemianopsia. Case 3 had a visual acuity of 20/100 on the right eye and papilledema and light perception on the left eye and the presence of sparse axillary hair.

**Laboratory Results:** Case 1 Admission CBC showed mild leukocytosis. He had a low thyroxine, slightly elevated TSH, low luteinizing hormone, normal follicle-stimulating hormone, cortisol and prolactin levels. Sellar MRI showed a large (4.4 x 3.2 x 3.4 cm) well-defined rim enhancing sellar-suprasellar mass with cystic component consistent with pituitary macroadenoma. Case 2 She had mild anemia, hypernatremia with elevated serum osmolality, and failure to concentrate urine. Hormonal studies showed normal thyroxine and growth hormone levels, low basal serum cortisol, and elevated prolactin levels. Cranial CT scan showed widening of the sella turcica with a homogenous, isodense, slightly enhancing focus in the sellar and suprasellar area. Water deprivation test was performed and consistent with partial central

diabetes insipidus. Case 3 Hormonal studies revealed moderately elevated prolactin levels and persistently low cortisol and free thyroxine levels despite hormonal replacement. Cranial CT scan showed a large, 5 x 2 x 2 cm hypodense, multi-loculated, rim-enhancing focus at the sellar-suprasellar area with compression of the 3rd and right lateral ventricle.

**Course:** Case 1 Transphenoidal surgery was performed and intraoperatively, purulent fluid was noted. Aspirate showed 0-2 cocci in pairs per high power field but no growth on culture. Final histopathology revealed acute inflammatory pattern with histiocytes consistent with abscess. Intravenous antibiotics were given for 8 weeks. Two weeks post-surgery, cranial CT scan showed regression of the abscess (3 x 2 x 3 cm) with return of sellar structures to their normal location. He had complete recovery of visual acuity on discharge. Case 2 Transphenoidal surgery was done and intraoperatively, purulent fluid was noted. Aspirate gram stain showed 1-2 polymorphonuclear cells per high power field but with no growth on culture. Intravenous Chloramphenicol and Ampicillin were given. Subsequently, vision was fully restored but prolactin levels continued to be slightly elevated. Basal cortisol and urine specific gravity were persistently low. Repeat CT scan showed disappearance of the mass. Six months postoperatively, she was able to resume work but continues to take Prednisone for hypocortisolemia and Carbamazepine for the diabetes insipidus. Case 3 Left frontal craniotomy was performed and intraoperatively, a pinkish fluctuant mass abutted the optic nerve anterior to the optic chiasm, which on opening, yielded purulent fluid. Drainage and marsupialization was done. Aspirate gram stain showed 0-5 polymorphonuclear cells per high power field with no microorganisms noted. Bacteriologic cultures likewise yielded negative results. Intravenous Oxacillin, Chloramphenicol and Metronidazole were given for 1 week. Postoperatively, her visual acuity improved but she developed transient diabetes insipidus responsive to fluid hydration. Repeat Cranial CT scan results showed marked decrease in the size of the previously noted sellar-suprasellar focus. Six months post-operatively, repeat hormonal studies showed persistently low-normal cortisolemia (5.26 µg/dL) and low free thyroxine (10.7 pmol/L) despite hormonal replacement. She is maintained on lifetime physiologic doses of Prednisone, Levothyroxine and conjugated estrogen with progesterone.

**Significance:** Literature review describes over 123 cases since Simmond's published case in 1914. We review 3 cases of pituitary abscesses seen at the Philippine General Hospital since 2004.

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**Recommendations:** The diagnosis of a pituitary abscess is difficult and relies on a thorough history and physical examination and a high index of suspicion. Unfortunately no preoperative diagnostic maneuvers are specific for pituitary abscess. In the evaluation of a patient with symptoms of hypopituitarism having a pituitary cystic mass with heterogenous intensity signal on imaging, a pituitary abscess should be considered as a differential diagnosis preoperatively.

**Keywords:** Pituitary abscess, thyromegaly, hypernatremia, hypocortisolemia

## CLINICAL PRESENTATIONS

### Case 1

A 24 year-old male was admitted at our institution for headache and blurring of vision. He was apparently well until 2 years prior to admission (PTA) when he experienced generalized headache and dizziness and blurring of vision which prompted consult. Cinnarizine and Vitamin B complex was prescribed which afforded no relief. Two months thereafter, there was noted of progressive loss of vision. Cranial computer tomography (CT) scan revealed a suprasellar mass measuring 3.4 x 3.8 cm. He was advised transphenoidal surgery, however was unable to comply due to financial constraints. He sought second opinion at the Neurosurgery Clinic whereby the consideration of a craniopharyngioma versus pituitary macroadenoma was made. Cranial magnetic resonance imaging (MRI) revealed a large, well-defined, rim-enhancing mass measuring 4.4 x 3.2 x 3.4 cm with cystic component. Skull radiography revealed that the anteroposterior diameter and depth of the sella turcica were widened and increased respectively, consistent with a pituitary adenoma. Hormonal studies revealed primary hypothyroidism (FT4 2.4 pmol/L, TSH 6.1 mIU/L), hypocortisolism (cortisol 28 mIU/L), and a normal prolactin level (128 mIU/L). His headache and visual impairment worsened prompting referral to Endocrine service where the considerations of a craniopharyngioma versus pituitary macroadenoma and primary hypothyroidism was made. Levothyroxine 75 µg daily prebreakfast was prescribed.

Review of systems revealed the patient to have slow mentation, sluggish movement, weight gain and constipation. There was no note of polyuria nor galactorrhea. There was no history of a previous chronic sinusitis, ear infections, dental extractions nor any history of head trauma or surgery nor the use of prolonged steroids nor familial history of a similar condition. There was a history of a left femoral head dislocation secondary to trauma in 2000. His growth and development was at par with age until

15 years of age when parents noted growth stunting. During this time, he had no facial, axillary and pubic hairgrowth and a decline in early morning erections and decreased libido. Physical examination revealed a stunted (1.28 meters), morbidly obese (BMI 36 kg/m<sup>2</sup>), myxedematous patient with normal vital signs, no thyromegaly nor breast discharges, absence of facial, axillary and pubic hair, penile length of 3 inches, testes approximately 8cc each, with note of hypoactive deep tendon reflexes and dry, coarse skin. Dental examination revealed irreversible pulpitis (#36), caries (#s 11, 26, 46), impacted teeth (#s 38, 48). The neurologic examination was normal with no meningeal irritation. The ophthalmologic evaluation and perimetry examination revealed 20/70 on the right eye and light perception on the left eye.

Admission CBC showed leukocytosis. Hormonal studies showed primary hypothyroidism (FT4 4.3 pmol/L, TSH 4.7 mIU/L), low normal cortisol (194 mIU/L), normal prolactin (125 mIU/L), low testosterone (<0.03 ng/mL), normal follicle stimulating hormone (< 1 mIU/mL) and a low luteinizing hormone (<3.5 mIU/mL). Thyroid ultrasound revealed normal findings, the right lobe measuring 3.4 x 1.4 x 1.3 cm and the left lobe measuring 3.4 x 1.3 x 1.4 cm. Paranasal radiography revealed air-fluids level in both the frontal sinuses suggestive of acute sinusitis with the rest of the paranasal sinuses within normal.

### Case 2

A 42 year-old female was admitted to our institution for headache. She was previously healthy until 4 months PTA, when she experience moderate grade, remittent fever with colds lasting for one month. This was followed by frontal headache, increased urinary volume, blurring of vision, and cessation of menses. Review of systems was unremarkable except for a specified amount of weight loss. She had normal vital signs, normal cardiac and lung examination, and Tanner Stage IV breasts and pubic hair development. The neurological examination was normal with no meningeal irritation. The ophthalmologic evaluation and perimetry examination showed visual field cuts compatible with bitemporal hemianopsia. On admission, she had mild anemia (Hemoglobin 11.3gm/dL), hypernatremia with elevated serum osmolality (306 mOsm/L), and failure to concentrate urine. Hormonal examinations showed normal thyroxine (100 nmol/L) and growth hormone levels (2 ng/ml), low basal serum cortisol (23.5 nmol/L), and elevated prolactin levels (1166 nIU/L) brought about by pituitary stalk compression. Cranial CT scan showed widening of the sella turcica

with a homogenous, isodense, slightly enhancing focus in the sellar and suprasellar area. Water deprivation test was performed and consistent with partial central diabetes insipidus.

### Case 3

A 37 year-old female was admitted for a 3-year history of headache and amenorrhea. She had no comorbid illnesses, but had a history of pulmonary tuberculosis with tuberculous lymphadenitis in 1993 and liver abscess in 1996. Menstruation was regular until 3 years ago when she became amenorrheic. Her condition started 6 months PTA, when she experienced increasing daytime somnolence, generalized body weakness and weight gain. No polyuria nor polydipsia noted. The months after, there was note of blurring of vision which prompted her to seek consult with an ophthalmologist who diagnosed the patient to have

bitemporal hemianopsia through visual field testing. Cranial CT Scan requested revealed a 2.5 x 2 x 2cm sellar-suprasellar mixed density mass. Hormonal assays revealed a low serum free thyroxine, cortisol and follicle stimulating hormone (FSH) levels, normal luteinizing hormone (LH), and elevated thyroid stimulating hormone (TSH) and prolactin levels. An initial diagnosis of cystic pituitary macroadenoma with secondary panhypopituitarism was made. She was seen by the General Endocrinology Clinic and started on Prednisone 10mg/tab one tablet daily and Levothyroxine 25 µg/tablet one tablet daily. She was admitted at our institution because of a 3-day history of severe headache and projectile vomiting. She had normal vital signs, visual acuity showed 20/100 on the right and papilledema and light perception noted on the left eye. She had sparse axillary hair, no nipple discharges with essentially normal cardiac and lung findings.

## DIAGNOSTIC WORKUP

**Table I. Summary of Laboratory Results of the Patients**

Laboratory	Case 1 (Lemoncito, Lantion-Ang, 2007)	Case 2 (Jimeno, Añel-Quimpo, 2004)	Case 3 (Tan, Sison, Jimeno, 2006)
CBC			
Hgb (gm/dl)	13.6	11.3	11.4
WBC ( $\times 10^9$ )	12.3	5.7	8.6
Sodium (mmol/L)	145	149	145
FBS (mmol/L)	4.21	Normal	4.93
USG	1.020 (range: 1.013-1.024)	1.005 (range: 1.002-1.005)	-
Serum Osmolality (mOsm/L)	-	306	-

\* CBC – complete blood count, Hgb – hemoglobin, WBC – white cell count, USG – urine specific gravity

**Table II. Hormonal Workup of the Patients**

Laboratory	Case 1 (Lemoncito, Lantion-Ang, 2007)	Case 2 (Jimeno, Añel-Quimpo, 2004)	Case 3 (Tan, Sison, Jimeno, 2006)
Thyroxine	4.3 pmol/L	100 nmol/L	9.4 pmol/L
TSH	4.7 mIU/L	-	0.35 mIU/L
Cortisol (8am)	194 mIU/L	23.5 nmol/L	22 nmol/L
Prolactin	125 mIU/L	1166 nIU/L	447 mIU/L
GH	-	2 ng/mL	Undetectable
Testosterone	0.03 ng/mL	-	-
FSH	<1.0 mIU/mL	-	1.8 IU/L
LH	<3.5 mIU/mL	-	4.1 IU/L

\* TSH – thyroid stimulating hormone, GH – growth hormone, FSH – follicle stimulating hormone, LH – luteinizing hormone

Imaging Results of the Patients

Case 1



Fig. 1 & 2. Pre-operative Skull Anteroposteriorlateral Views Showed Widening of the Anteroposterior Diameter and Depth of the Sella Turcica Consistent with Pituitary Adenoma.

Case 1

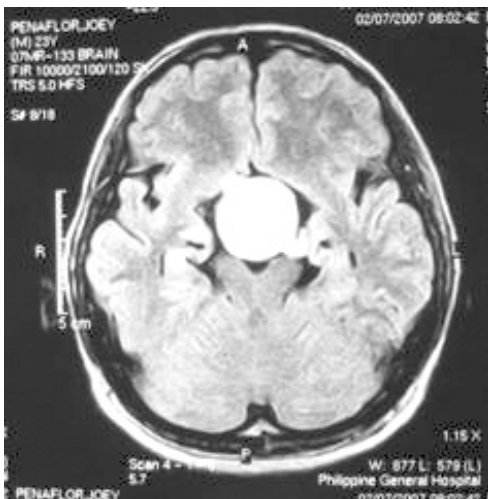


Fig 4. Cranial MRI (Coronal Section)



Fig 5. Cranial MRI (Sagittal Section)

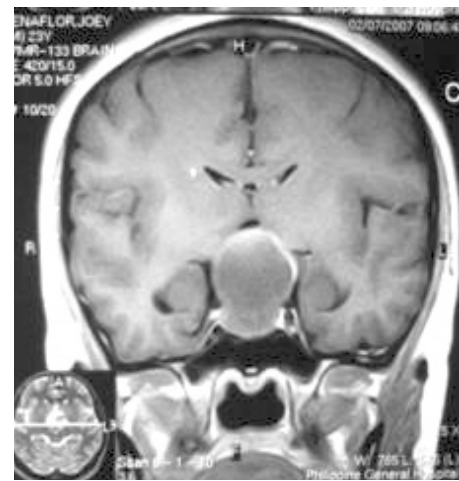


Fig 6. Preoperative Cranial MRI (Frontal view)

Case 2

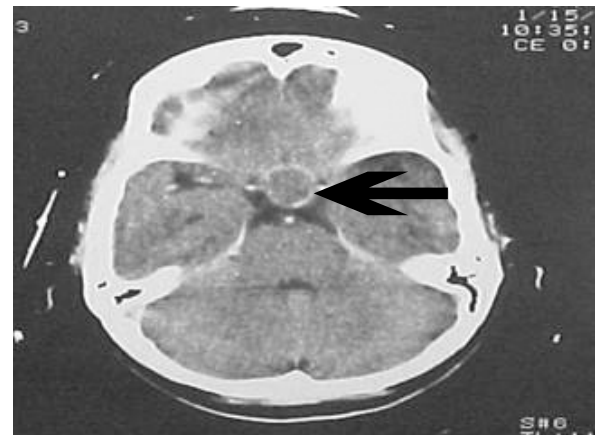


Fig 1. Pre-operative CT Scan Image: Horizontal Section (with contrast)

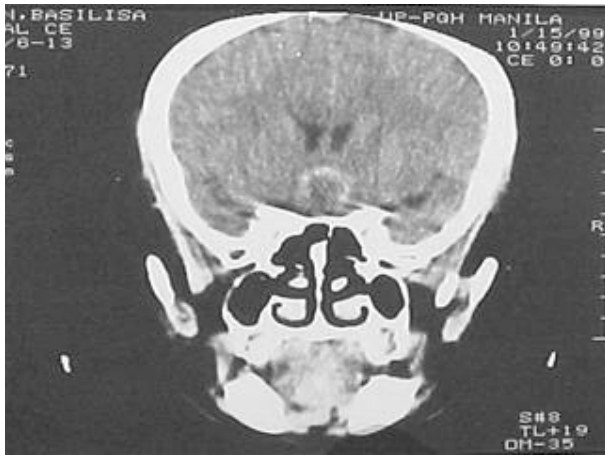


Fig 2. Pre-operative CT Scan Image: Coronal Section (with contrast)

## CLINICAL COURSE

### Case 1

He underwent transphenoidal surgery whereby intraoperatively, approximately 2 cc of purulent fluid was drained with note of a pituitary tumor. Marsupialization was done. Aspirate showed 0-2 cocci in pairs per high power field but no growth on culture after 4 days. Tuberculous bacilli culture revealed no growth. Final histopathology results revealed acute inflammatory pattern with histiocytes consistent with abscess. Post-operatively, she was given intravenous Ceftriaxone 4 gm daily and Metronidazole 2 gm daily initially. However, 2 days post-operatively, patient had febrile episodes, clear lung fields, no nuchal rigidity was noted. Nosocomial meningitis was considered thus antibiotics were shifted to intravenous Cefipime 4 gm daily and Vancomycin 2 gm daily and lumbar puncture was performed which revealed light yellow, clear cerebral spinal fluid, white blood cell count of 16,000, 16% lymphocyte predominance, with normal protein and sugar levels. No polymorphonuclear cells, acid fast bacilli nor encapsulated organisms were seen on India ink. There was no growth in the cerebrospinal fluid and blood culture studies. Antibiotics were shifted to intravenous Penicillin 24 million units daily and Metronidazole 2 gm daily to complete 8 weeks. He subsequently underwent extraction of dental caries (#s 11, 26, 46) during his admission. Post-operatively, patient noted resolution of the headache and improvement in the visual acuity as early as 1 day post-surgery and discharged with a visual acuity of 20/20-1 on the right eye and 20/20-3 on the left. Two weeks post-operatively, repeat cranial CT scan showed a decrease in the size (3 x 2 x 3cm) of the pituitary abscess with return of sellar

structures to their normal location. Six weeks post-operatively, repeat cranial CT scan revealed further decrease in the size of the pituitary abscess to 2 x 1.2 x 2cm and note of a cystic hygroma in the sella turcica. He was discharged improved after 8 weeks with Levothyroxine replacement. Four months after surgery, he has returned to work as a welder.

### Case 2

Preoperatively, the diagnosis was pituitary macroadenoma with hyperprolactinemia and hypopituitarism. She was started on Prednisone 5 mg/tab one tablet daily. Water deprivation test was done and was compatible with the impression of partial central diabetes insipidus. Carbamazepine 200 mg/tablet two times a day was given with improvement of polyuria. She underwent surgery using the transphenoidal approach. On opening of the dura, a gush of purulent discharge was noted. The aspirate was sterile on culture although no anaerobic cultures were done. Post-operatively, she was given intravenous Chloramphenicol and Ampicillin. Her diabetes insipidus worsened post-operatively and was treated with subcutaneous doses of anti-diuretic hormone (Pitressin) and fluid replacement. Two weeks after the transphenoidal surgery, patient's vision was fully restored. Repeat hormonal examinations 3 months post-surgery still showed depressed basal cortisol (102 nmol/L) and elevated prolactin levels (911 nIU/L) due to stalk compression. Menses have not been restored during her follow-up consults. Ideally she should be maintained on anti-diuretic hormones (Pitressin) however due to financial constraints she is presently on Carbamazepine, 200mg/tab two times a day for diabetes insipidus and Prednisone 5 mg once a day for hypocortisolism. Four months after surgery, she is back to work as an office cleaner.

### Case 3

She underwent left frontal craniotomy whereby intraoperatively, a pinkish fluctuant mass abutted the optic nerve anterior to the optic chiasm, which on opening, yielded approximately 2 cc of purulent fluid. Drainage of the abscess was performed with marsupialization of the abscess cavity. Abscess gram staining showed 0-5 polymorphonuclear cells with no microorganisms noted. Bacteriologic cultures likewise yielded negative results. She was started on intravenous Oxacillin 4 gm daily, Chloramphenicol 4 gms daily and Metronidazole 2 gm daily for 1 week. Post-operatively, she developed transient diabetes insipidus responsive to fluid hydration. She was discharged on physiologic doses of Prednisone and

Levothyroxine with an additional 2-weeks course of Cloxacillin. Six weeks post-operatively, there was improvement of visual acuity to 20/50 on the right and 20/200 on the left eye. Repeat Cranial CT scan results showed marked decrease in the size of the previously noted sellar-suprasellar focus with resolution of the transependymal effusion. However, the left lateral ventricle was still mildly dilated with minimal subdural effusion in the left frontal convexity. Six months post-operatively, repeat hormonal studies showed persistently low-normal cortisolemia (5.26 µg/dL) and low free thyroxine (10.7 pmol/L) despite hormonal replacement. No resumption of menses was noted. She is presently maintained on lifetime physiologic doses of Prednisone, Levothyroxine and conjugated estrogen with progesterone.

## DISCUSSION

Pituitary abscess is an uncommon but potentially life-threatening disease, accounting for 0.2-0.6% of all pituitary lesions operated.<sup>1,2</sup> Since its first recognition in 1914 by Simmonds, there have only been 123 cases reported worldwide. There is no current local data on the incidence of pituitary abscess in the Philippines. Since 2004, there have been 3 cases of pituitary abscess reported in the Philippine General hospital. The differentiation of pituitary abscess from adenoma is difficult both clinically and radiologically and remains a challenge for most physicians.

Pituitary abscesses denote involvement of the pituitary gland by an intrasellar infectious process characterized by the presence of an acute or chronic inflammatory reaction. This process may be derived from a localized or general infection source (meningitis, sepsis), facilitated or not by a previous sellar lesion as adenoma, craniopharyngioma or Rathke's cleft cyst. Neither a definite infection origin nor associated conditions were apparent in half of cases reviewed by Lindholm *et al.*<sup>5</sup> Generally, it should be considered in patients presenting with signs of an expanding process in the sella turcica associated with recent history of rhinorrhea, meningitis, or pleocytosis of the cerebrospinal fluid. The incidence is not age or sex dependent. Wilson *et al.* did however report female predominance within cases of pituitary abscesses.<sup>4</sup> In the case series of 29 patients, there were reported 16 females and 13 males with age range between 12 to 69 years.<sup>3,4</sup> We report 2 female patients and 1 male patient with age range of 24 to 42 years which is consistent with foreign data.

Pituitary abscesses can be divided into primary or secondary. Primary pituitary abscess, accounting for 2/3rds of cases, occur within a previously healthy gland. Whereas, secondary pituitary abscess, arise within an existing lesion such as craniopharyngioma, Rathke's cleft cyst or pituitary adenoma. These can be caused either by hematogenous seeding of the pituitary gland or by direct extension of an adjacent infection such as: meningitis, sphenoid sinusitis, CS thrombophlebitis and contaminated CSF fistula. A review of 24 cases of pituitary abscess by Vates *et al*<sup>6</sup> revealed that 19.7% of patients had a history of possible sepsis or sources of bacteremia, 12.5% had a history of rhinorrhea consistent with CSF leakage, 41.7% had undergone previous surgery for pituitary or sphenoid sinus disorders, 8.3% had undergone sellar radiation surgery, while 4.2% had long-standing history of sphenoid sinusitis. Lindholm *et al*<sup>5</sup> did not identify an infectious origin or tumor coexistence in 9 out of 21 cases. Jimeno *et al*<sup>21</sup> reported that the primary source of infection was from a chronic maxillary and frontal sinusitis, while according to the case report of Tan *et al*,<sup>22</sup> no identifiable source of infection nor pre-existing sellar tumor was noted. Although there was a note of air-fluid levels in both frontal sinuses on paranasal Xray suggestive of acute sinusitis in Case 1, there was no pertinent history of rhinitis or sinusitis noted. Upon further evaluation by Otorhinolaryngology service, there was no evidence of chronic sinusitis that could point to a primary source of infection in the patient.

The most common organisms usually involved are gram-positive cocci (Staphylococcus, Streptococcus species), while among the gram-negative or coliform bacteria (Neisseria, E. coli, and Corynebacterium).<sup>5,6</sup> Other uncommon organisms such as fungi (Aspergillus,<sup>7,8</sup> Candida,<sup>9</sup> Coccidioidomycosis,<sup>10</sup> Histoplasmosis,<sup>11</sup> Blastomycosis<sup>12</sup>), parasites (Cysticercosis<sup>13</sup> and Echinococcosis<sup>14</sup>). Vates *et al*<sup>6</sup> reported that 58.3% of patients had gram stains or cultures that were positive for pathogens. In 87.5% of patients who were suspected to have either an abscess or a CSF leak with meningitis, the cultures were positive.

The most common clinical manifestations are the presence of headache (91.7%) and visual field defects (50%).<sup>6</sup> All 3 patients presented with headache ranging from 4 months to 4 years duration and visual field deficits on admission. Fever is present in 50% of patients.<sup>16</sup> However according to Vates *et al*, 33% of patients can present with fever and peripheral leukocytosis which can lead one to consider pituitary abscess over pituitary adenoma. Only Case 1 presented with mild leukocytosis on admission, which should have aided the consideration of abscess

formation preoperatively. Meningitic syndrome may be associated to pituitary mass effect signs,<sup>15</sup> in up to 90% of cases. Abnormal pituitary function (54.2%) is manifested as panhypopituitarism in 50% of patients and the most common signs of impaired endocrine function are the following: decreased libido, polyuria, polydipsia, cold intolerance and amenorrhea. Case 1 presented with primary hypothyroidism and secondary hypogonadism as documented by decreased frequency in morning erections and decreased libido, small testicles, and low serum testosterone and luteinizing hormone levels. Case 2 and Case 3 presented with amenorrhea, hypocortisolemia, and hyperprolactinemia. Diabetes insipidus presents in only 10% of patients with pituitary adenomas, but occurs in almost half of patients with abscess. This was documented in both our female patients needing fluid replacement and anti-diuretic hormones initially. Case 2 requires Carbamazepine as maintenance medication for her diabetes insipidus.

The diagnosis of a pituitary abscess is difficult and relies on a thorough history and physical examination and a high index of suspicion. Unfortunately no preoperative diagnostic maneuvers are specific for pituitary abscess. However, knowledge of several features can suggest its presence. As previously mentioned, a past history of meningitis, sinusitis or sepsis may suggest the diagnosis. Rapid neurological deterioration in a patient with a sellar tumor after a presumed bacteremia should point to the possibility of abscess formation.<sup>18</sup>

Cerebrospinal fluid (CSF) examination may be useful even without signs of meningitic syndrome. It may reveal slight pleocytosis, elevated protein content, or decreased glucose levels, suggesting a parameningeal focus of inflammation.<sup>19</sup> Case 1 had a CSF examination which was essentially normal.

Imaging can be helpful and suggestive rather than specific for diagnosis. The skull radiograph may show widening of sella turcica, erosion of the sellar floor, and opacity of the sphenoidal sinus as was seen in Case 1. In Lindholm *et al*,<sup>5</sup> only 3 out of 21 patients had a normal sella. Erosion and or expansion were the most common sellar findings. The cranial CT scan would most commonly show erosion and enlargement of sella turcica and an isodense mass with enhancement of its outline by contrast injection. The presence of hypodensity in the pituitary gland with enhancement of its outline by contrast injection and filling the sphenoid sinus with destruction of the sellar floor are nonspecific.<sup>20</sup> All patients had sellar-suprasellar enhancing masses (Case 1 and 3 were noted to be rim-enhancing with

cystic component or mixed density) consistent with pituitary adenoma preoperatively. Cranial MRI which is the best examination in the radiologic evaluation of a pituitary abscess would reveal enlargement of the sella turcica. The T1WI would show a hypo-isointense sellar mass while the T2WI would show a hyperintense sellar mass with peripheral contrast-enhancing rim (increased signal is due to increased protein content). Only Case 1 underwent a cranial MRI which showed rim-enhancing sella-suprasellar mass with cystic components. Despite CT and MRI use, the preoperative diagnosis of pituitary abscesses remains difficult and challenging. Several studies have concluded that in the evaluation of a patient with symptoms of hypopituitarism having a pituitary cystic mass with heterogenous intensity signal on imaging, a pituitary abscess should be considered as a differential diagnosis preoperatively.

Surgery via transphenoidal approach is the treatment of choice and aims to prevent contamination of CSF, provides a route for prolonged drainage of the infected area, allows decompression of optic chiasm and helps in the management of associated sinusitis if present. Two of our patients underwent the transphenoidal approach while one patient underwent left frontal craniotomy because of the large size of the abscess. Prompt empiric antibiotics should be initiated once there is a high suspicion for the diagnosis and adjusted accordingly once the focus has been identified and should be continued for a period of 2-6 weeks.

Early diagnosis and aggressive antibiotic treatments have decreased mortality down to 8.3%. Seventy-five percent of patients have full resolution of visual abnormalities after surgery. In the review of Vates *et al*, 54% who had endocrine dysfunction before surgery and 38.5% whose endocrine dysfunction was caused by preexisting pituitary disease experienced no improvement in their endocrine deficits after surgery, but no new pituitary dysfunction developed. During the long term follow-up, 61.5% had a new endocrine dysfunction related to their pituitary abscess, 12.5% died of recurrent pituitary abscess, 62.5% had persistent pituitary dysfunction requiring long-term hormone replacement therapy while 25% had complete resolution of their endocrinopathy. All 3 patients had full recovery of visual acuity and resolution of headache postoperatively. With regard to presence of endocrine dysfunctions after surgery, Case 1 was still maintained on physiologic dose of Levothyroxine 7.5 µg daily. Case 2 is also maintained on Prednisone for her hypocortisolemia and Carbamazepine for her diabetes insipidus. Case 3 is being maintained on Levothyroxine, Prednisone and

conjugated estrogen with progesterone. Fortunately, all patients have been able to return to work fully functional up to the present time.

## CONCLUSIONS

The diagnosis of a pituitary abscess is difficult and relies on a thorough history and physical examination and a high index of suspicion. Patients would commonly present with headache and visual field cuts as well as panhypopituitarism in 50% of patients mimicking pituitary adenoma. The presence of fever and peripheral leukocytosis should lead the physician in charge to consider pituitary abscess preoperatively. Unfortunately, there are no preoperative diagnostic maneuvers specific for pituitary abscess, thus a high index of suspicion is required. The advent of newer imaging techniques such as computer tomography scans and magnetic resonance imaging have aided early preoperative detection of pituitary abscess. Thus, it is prudent that in the evaluation of a patient with symptoms of hypopituitarism having a pituitary cystic mass with heterogenous intensity signal on imaging, a pituitary abscess should be considered as a differential diagnosis preoperatively.

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