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Case Report

Pituitary Abscess: A General Retrospective Diagnosis

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Abstract

We present the case of a 27-year-old female who had a history of recurrent headaches and visual disturbances. Magnetic resonance imaging of the brain showed a lesion that suggested pituitary adenoma, with indications of a recent bleeding or cystic degeneration. Nonhormonal deficiencies were documented, restricted to nontumoral hyperprolactinemia. Transsphenoidal approach surgery was performed and the purulent material was drained, confirming the diagnosis of pituitary abscess. Sinusitis was considered to be the only possible cause of this condition. Empirical treatment to Gram-positive anaerobic cocci was administrated, with a satisfactory response.

Key Words: abscess, pituitary diseases, brain abscess

Introduction

A pituitary abscess is a rare but potentially life-threatening disease, accounting for less than 1% of all pituitary lesions. Symptoms can be grouped into 4 categories: inflammatory responses (fever and leukocytosis), mass effects, local meningitis or sinusitis (headaches and visual disturbances), and hormonal deficiency [1].

The disease can develop de novo in normal pituitary tissue (approximately 70%) or in a pre-existing pituitary pathology (approximately 30%), out of which pituitary adenomas are the most common cases, followed by Rathke's cleft cysts and craniopharyngiomas. Preoperative diagnosis is a dilemma, as symptoms such as pituitary abnormal function are nonspecific. Radiologic findings cannot always distinguish it from other pituitary lesions. In addition, 70% to 80% of the cases do not present signs of infection. The culture results are only positive in around 47.5%. The most common infectious agents are Gram-positive cocci (50%), Gram-negative bacilli, fungi, amoeba, and yeast. In the majority of cases, however, an organism is not identified [2, 3].

We present the case of a patient with a pituitary abscess retrospective diagnosis, detected by symptoms of mass effect.

Case Presentation

The 27-year-old female patient reported a history of throbbing headaches and decreased visual field for a period of a month, with no constitutional symptoms or history suggestive of hormonal changes or cranial nerve palsies. There was no relevant family history or disease diagnosis.

Diagnostic Assessment

The hormonal test (see Table 1) only showed nontumoral hyperprolactinemia of 82.77 ng/mL (82.77 µg/L). Other hormonal and electrolytes evaluations were normal. Pituitary magnetic resonance imaging (MRI) showed a lesion in the sellar that suggested pituitary adenoma, with indications of a recent bleeding or cystic degeneration, with dimensions of 17*11*21 mm, and with moderate and peripheral enhancement to the contrast medium (see Fig. 1).

Treatment

A transsphenoidal surgery was performed, after opening the dura of the sellar floor. Yellow pus gushed out in an amount of 5 cc, approximately. The intraoperative diagnosis was pituitary abscess. Treatment with ceftriaxone 2gr twice a day and metronidazole 500 mg 3 times a day was established for 6 weeks.

Outcome and Follow-up

The postsurgical pituitary MRI showed a lesion persistence, and the patient developed transitory insipidus diabetes, which was treated with a 2-dose desmopressin at 120 µg a day. The microbiological analysis reported abundant Gram-positive cocci, probably anaerobic, because there was no development in an aerobic culture medium, and we did not have an anaerobic culture medium to confirm. The histological report conveyed acute inflammation.

The patient responded adequately to the treatment, and the symptoms improved. There were no hormonal deficiencies in the follow-up, and the pituitary lesions disappeared (see Fig. 2 and Table 1).

Discussion

Over 90% of sellar masses are pituitary adenomas. A young patient with headaches and pituitary endocrinopathy, showing a sellar mass on radiology, is often diagnosed as having a

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Table 1. Laboratory findings

Hormones	Value before treatment	Value after treatment	References values
Cortisol (μg/dL)	16.47	16.57	4.5-24
Luteinizing hormone (mUI/mL)	0.77	4.11	2.4-12.6
Follicle-stimulating hormone (mUI/mL)	1.65	5.22	3.5-12.5
Estradiol (pg/mL)	90.24	64.26	19.0-144.0
Prolactin (ng/mL)	82.77	20.19	4.79-23.3
Diluted prolactin 1:100	88.26		
Thyroid-stimulating hormone (μUI/mL)	1.87	2.87	0.27-4.2
Free thyroxine (ng/dL)	0.98	1.30	0.93-1.70
Growth hormone (ng/mL)	0.33		0.02-4.77
Insulin-like growth factor 1 (ng/mL)	140.4	183.2	151-353
Others			
Glucose (mg/dL)	85	86	70-105
Creatinine (mg/dL)	0.66	0.63	0.57-1.11
Sodium (mEq/L)	140	140	136-145
Potasium (mEq/L)	4.40	4.30	3.5-5.10
Hemoglobine (g/dL)	14.4	13.8	13-18
Total leucocites (cell × 10^3/μL)	4.06	5.07	4.6-10.20
Total neutrophils (cell × 10^6/μL)	1.96	2.37	1.5-7.0
Total lymphocytes (cell × 10^6/μL)	1.57	2.00	1.0-3.7
Platelets (cell*10^3/μL)	251	336	150-450

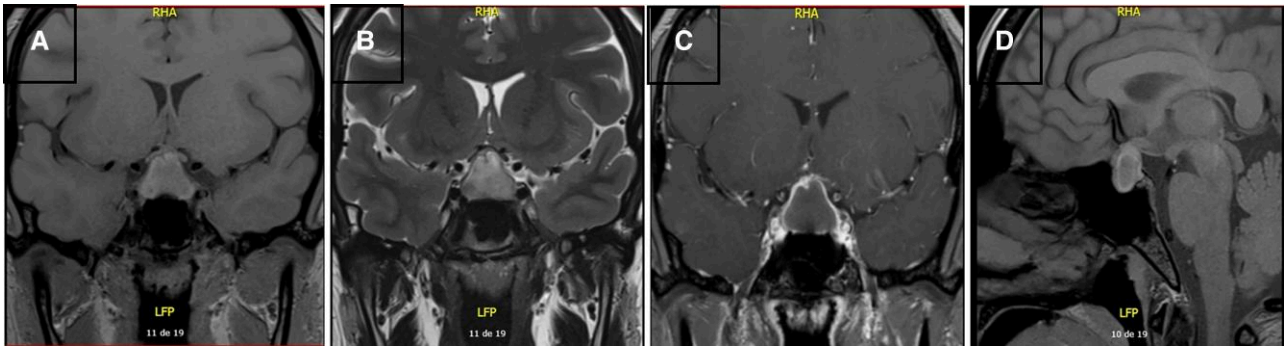

Figure 1. Presurgical MRI with sellar focus. (A) Coronal T1 with high-increased signal intensity. (B) Coronal T2 with a heterogenous intensity. (C) Coronal T1-weighted with peripheral enhancement to contrast medium. (D) Sagittal T1, where the enlargement of stalk pituitary was observed but no thickened stalk was present. Abbreviations: MRI, magnetic resonance imaging.

pituitary adenoma. Rarely can inflammatory and infection processes affect the sellar and suprasellar regions, and most would be considered to be a part of differential diagnoses of lesions in this zone. Because the most frequent symptoms are nonspecific and can be found in other pituitary pathologies, they are generally related to hypofunction of the anterior pituitary (weakness, anorexia, vomiting, amenorrhea, and hypogonadism, headache, and visual disturbances). The findings that suggest the possibility of a pituitary abscess are the presence of diabetes insipidus, which is reported in up to 47.9% (but is rare in adenomas at only around 10%); as well as the classic MRI findings such as a cystic or partially cystic lesion with ring enhancement in contrast medium (present in up to 66.7%) [4]. In the case of our patient, the characteristics of the MRI and the frequency of the pituitary lesions first led the radiology report to determine it was a pituitary adenoma.

Since the first description by Heslop in 1848, only a few hundred cases have been reported in the literature (approximately 200 cases in 2017) [2], and the majority are single cases. Most of the published literature focusing on pituitary abscess are case reports. The most significant number of cases (66 cases) was reported by Gao et al [4]. It has been shown that preoperative diagnosis of pituitary abscess is challenging.

The symptoms in this case were those of mass effect or sinusitis, and the individual did not present any hormonal deficiencies, which are the symptoms that are most frequently reported by these patients. A literature review of 200 patients with pituitary abscess [2] showed that the most frequently reported symptoms are headaches (76.5%) and visual deficits (53.5%). Abnormal hormonal tests prevail in 75.5% of patients, but only 7.9% of them present exclusive hyperprolactinemia as an endocrine finding, which was also the case with our patient.

Figure 2. MRI after treatment with antibiotics. In coronal T1 (A) and sagittal T1 (B) it was observed that the lesion disappeared. Abbreviations: MRI, magnetic resonance imaging.

Pituitary abscesses are divided into 2 types: primary and secondary. The primary subtype develops in a previously normal pituitary gland (accounting for 70% of cases), and the secondary emerges from pre-existing pituitary lesions such as craniopharyngioma, pituitary adenoma, or Rathke's cleft cyst. This pathology can be observed because of the hematogenous spread of infection adjacent to the sellar region, such as sphenoid sinusitis or dental infection. In addition, there are possible risk factors for pituitary abscess, such as previous surgical or irradiation interventions, sepsis, local infection, or diabetes mellitus [5-7]. In our case, after the primary diagnosis and with no systemic symptoms, when looking for a possible cause we only found pansinusitis but no other risk factors (inclusive immunodeficiency was excluded). The patient had no previous symptoms of pansinusitis, but it was found in the imaging study during the diagnostic approach, and after the medical treatment of the pituitary abscess with antibiotics, the infection of the paranasal sinuses was resolved.

The microbial agents are usually Gram-positive pathogens, including Staphylococcus or the Streptococcus species. However, almost half of the obtained cultures were negative [4, 5]. Our patient turned out negative to development in the culture of the drain but showed abundant Gram-positive cocci with highly probable anaerobic agents, which guided the antibiotic treatment. Peripheral blood culture was positive to a development of Staphylococcus epidermitis, but we did not exclude the possibility of contamination. However, this finding could help detect microbial agents in future patients with a negative culture of the primary site. It is important to consider the possibility of tuberculosis in a differential diagnosis in high-prevalence geographical locations. In the case of our patient, despite living in a high prevalence area, there was no suspicion of tuberculosis because no bacilli were observed and the Ziel Neelsen stain was negative.

As of recently, with the increased number of pituitary abscess cases and the development of MRI technology, some MRI characteristic manifestations of pituitary abscess have been observed. This entity may show ring enhancement without an internal one during an enhanced scan. The abscess cavity may show a high signal in diffusion-weighted imaging, with an apparent decreased diffusion coefficient, and the abscess wall may show a low signal [8]. The increased signal intensity on T1-weighted images is due to high protein content and may suggest a solid lesion, such as an adenoma. The usefulness of diffusion-weighted imaging has suggested that pus within the abscess cavity is responsible for the spread

Table 2. Characteristics of patients included in the largest case series reported

Reference	Average age (years), sex	Presenting complaints	Endocrine findings	Typical MRI findings[a]	Treatment	Accuracy of diagnosis[b]	Causative organisms[c]
Vates et al, 2001 [10] (24 patients)	41.3 M 15/24 = 62.5% F 9/24 = 37.5%	HA 22/24 = 91.7% VD 12/24 = 50%	Normal 11/24 = 45.8% Abnormalities 13/24 = 54.2% DI = Not reported	Yes 5/24 = 20.8%	SM 24/24 = 100%	Yes 5/24 = 20.8%	Positive 14/24 = 58.3% Negative 10/24 = 41.7%
Gao et al, 2016 [4] (66 patients)	45.5 M 30/66 = 45.5% F 36/66 = 54.5%	HA 46/66 = 69.7% VD 30/66 = 45.5%	Normal 12/66 = 18.2% Abnormalities 54/66 = 81.8% DI 31/66 = 47.9%	Yes 40/66 = 66.7%	SM 66/66 = 100%	Yes 39/66 = 59.1%	Positive 13/66 = 19.7% Negative 53/66 = 80.3%
Liu et al, 2011 [5] (33 patients)	41.6 M 12/33 = 36.4% F 21/33 = 63.6%	HA 23/33 = 69.7% VD 9/33 = 27.3%	Normal 5/33 = 15.2% Abnormalities 28/33 = 84.8% DI 23/33 = 69.7%	Yes 21/33 = 63.6%	SM 30/33 = 90.9% MED 3/33 = 9.1%	SM 15/30 = 50% MED 3/3 = 100%	Positive 5/30 = 16.7% Negative 25/30 = 83.3%
Zhang et al, 2012 [9] (29 patients)	40.2 M 12/29 = 41.4% F 17/29 = 58.6%	HA 21/29 = 72.4% VD 10/29 = 34.5%	Normal 10/29 = 34.5% Abnormalities 19/29 = 65.5% DI 12/29 = 41.4%	Yes 23/29 = 79.3%	SM 100%	Yes 14/29 = 48.3%	Negative 29/29 = 100%
Our case	27 F	HA, Yes VD, Yes	Abnormalities[d], Yes DI not presented	Yes	SM	No	Positive

Abbreviations: F, female; DI, diabetes insipidus; HA, headache; M, male; MED, medical management; MRI, magnetic resonance imaging; SM, surgical management; VD, visual deficit.

[a]Ring-enhancing, cystic, or partially cystic pituitary lesion.

[b]Correct diagnosis of pituitary abscess before treatment.

[c]Causative organisms refer to Gram stains or cultures develop.

[d]Before surgery, only had elevated serum prolactin.

restriction, because it is a viscous fluid consisting of inflammatory cells, debris, and macromolecules such as fibrinogen [9]. Our patient showed only the ring enhancement as described and an increased signal intensity on T1-weighted images. The intensity of T2 was not hyperintense like cystic lesions, and there was some heterogeneity. There was no thickened pituitary stalk but only a little elongation.

Differential diagnosis should be carried out based on clinical and radiologic findings. As such, a primary abscess of the chiasmal-sellar regions should be differentiated from cystic pituitary adenomas, craniopharyngiomas, Rathke cleft cysts, intrasellar aneurysms, and other local conditions. Shkarubo et al showed that only in 54.8% of the cases, an abscess was suspected, according to the clinical symptoms prior to surgery. Based on their experience in the pituitary health center, Gao et al suggested considering pituitary abscess in patients with cystic or partially cystic sellar mass when they meet the following criteria: past history of infectious disease of the sellar or an adjacent region, such as sphenoid sinusitis or paranasal sinusitis, or transsphenoidal surgery in the area; clinical manifestations of anterior pituitary hypofunction, especially panhypopituitarism, combined with diabetes insipidus or visual disturbances with or without fever; and MRI showing typical rim enhancement with a relatively thick and ruffled wall [4]. Table 2 shows a summary of the data found from the 4 series with the most reported pituitary abscess cases.

A variety of treatment modalities have been used in the management of both primary and secondary pituitary abscesses. Currently, there are no predefined guidelines in the treatment regimen for such a diagnosis. Medical treatment includes antibiotic therapy, which should be given for about 4 to 6 weeks, and empirical treatment with Ceftriaxone is indicated (other authors suggest empirical therapy with metronidazole and ceftriaxone, with the possible inclusion of vancomycin) while awaiting microbiological and histological confirmation. While some authors have documented a conservative treatment with intravenous antibiotics alone, as an initial empirical treatment, the majority of cases are diagnosed and treated with surgical exploration [6]. In this case, the patient had a surgical treatment before the antibiotics, because the initial suspicion was not a pituitary abscess. After the diagnosis, the empirical antibiotic therapy had an adequate response and recovery was successful.

Appropriate and timely treatment of pituitary abscess typically results in low mortality rates. There have been a few case reports of pituitary abscesses causing death. The approximate mortality rate is of 4.5% to 8.3%, and the causes point to pituitary apoplexy, hypothalamic dysfunction, sepsis, meningitis, or systemic disease [2].

This case uniquely illustrates the presentation and clinical management that generally happen regarding patients with the diagnosis of a primary pituitary abscess (retrospective, after a surgical procedure). Our patient did not have any hormonal deficiencies, but the literature reports that approximately half of the patients eventually need multiple hormone replacement [1]. There was no presurgical suspicion of pituitary abscess by the absence of inflammatory symptoms, but the response to the treatment after the surgery drainage was adequate and the patient evolution satisfactory.

Learning Points

- Pituitary abscess remains an uncommon clinical condition, and it should be considered in the differential diagnosis for patients with headaches, visual disturbances, and pituitary endocrine abnormalities because an efficient surgical and medical management will result in a lower mortality.
- The diagnosis of pituitary abscess should be considered in patients with rim-enhancing sellar cystic mass, clinical manifestation of anterior pituitary hypofunction combined with diabetes insipidus, headache, and visual disturbances, especially with a history of infectious disease of the sellar or an adjacent region, sinusitis, or transsphenoidal surgery.
- In more than half of the cases, the diagnosis is retrospective, since presurgery suspicion in some cases is extremely difficult due to overlapping clinical signs, variable symptoms, and imaging and laboratory findings related to other sellar lesions.

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Author Contributions

All authors made individual contributions to authorship; I.M.T.H, M.R.G.S., and B.G.V. were involved in the diagnosis and management of this patient and manuscript submission; M.R.G.S. and G.V.O. were involved in manuscript writing and submission. All authors reviewed and approved the final draft.

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The authors have nothing to disclose.

Informed Patient Consent for Publication

Signed informed consent was obtained directly from the patient.

Data Availability Statement

Data sharing is not applicable in this article, as no data sets were generated or analyzed during the present study.

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