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Case Report

Pediatric sellar-suprasellar tuberculosis: A case report and review of the literature

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ABSTRACT

Background: Pediatric sellar-suprasellar tuberculosis is a rare form of tuberculosis that affects the pituitary gland and surrounding areas in the brain. It can be difficult to diagnose based on clinical and radiological signs alone, as they can be similar to other pituitary masses. A combination of biological, hormonal, and imaging examinations can aid in making an accurate diagnosis. It is important to consider tuberculosis in the differential diagnosis of sellar-suprasellar masses in the pediatric population, especially in areas with a high prevalence of tuberculosis.

Case Description: A 17-year-old male with no history of illness showed up with a series of symptoms, including headaches and vision problems. A sellar-suprasellar lesion was seen on imaging, along with several minor lesions. The diagnosis of tuberculosis meningitis with cerebral and pituitary tuberculoma was made after cerebrospinal fluid analysis revealed the presence of tuberculosis. Treatment with anti-tuberculosis drugs led to clinical improvement and lesion resolution.

Conclusion: Children's sellar tuberculomas can be difficult to diagnose since they resemble other pituitary tumors. It is essential to take them into account in the differential diagnosis, especially in regions with a high incidence of tuberculosis. Long-term chemotherapy is the recommended course of treatment, and monthly follow-up visits are necessary to check hormone levels and evaluate whether a permanent hormone replacement is necessary.

Keywords: Antitubercular chemotherapy, Granuloma, Meningitis, Pediatric infection, Pituitary tuberculosis

INTRODUCTION

Mycobacterium tuberculosis is a highly infectious disease that is responsible for the greatest number of deaths worldwide caused by a single organism. It primarily affects the lungs, but extra-pulmonary localization has also been reported. Despite advances in medical treatment, tuberculosis remains a major global health problem, with an estimated 1.3 million deaths in HIV-negative patients in 2020. Only 1% of tuberculosis cases worldwide involve the central nervous system, which can affect the brain, meninges, or adjacent bone depending on the host's immune factors.[3,25,32] Isolated pituitary tuberculosis is an extremely rare form of the disease. Rokitansky first described it in 1844, and Letchworth reported it as an autopsy examination of pituitary tuberculoma in 1924.[17,18]

According to the literature, there were 28 cases of pediatric pituitary tuberculosis reported up to 2022 [Table 1], with the first case reported in 1992.[9,13,20,23,24,28,31,33,34] About 62% of these cases are reported from India. The clinical presentation and even the radiological assessment of pituitary tuberculosis can be closely similar to pituitary masses, leading in most cases to surgery, with the diagnosis confirmation mostly made by histological examination, while the therapeutic care for this disease remains specifically medical by anti-tubercular treatment.

In this report, we present a case of pediatric pituitary tuberculosis and review the literature on children. It is important to consider tuberculosis in the differential diagnosis of sellar-suprasellar masses in the pediatric population, especially in areas with a high prevalence of tuberculosis.

CASE REPORT

A 17-year-old male without a medical history presented progressive symptoms during the past month, consisting of headaches, decreased visual acuity, and visual field impairment with right temporal hemianopia. The clinical examination found a conscious patient, slightly feverish, pulse was 78/min, and his blood pressure was 120/76 mm Hg. The lung examination was clear on auscultation. The chest radiograph was normal. Magnetic resonance imaging (MRI) of the brain shows a sellar-suprasellar lesion, isointense to hypointense on T1, isointense to hyperintense on T2 [Figure 1], enhanced heterogeneously with gadolinium [Figures 2a and b], with other small lesions in the posterior cerebral fossa and the hypothalamus. On investigation, cerebrospinal fluid (CSF) fluid analysis revealed lymphocytic pleocytosis, low glucose, and a high protein level. Polymerase chain reaction (PCR) for *M. tuberculosis* was positive in the CSF, and the results of the Interferon-Gamma Release Assays and Mantoux test were positive. Evaluation of pituitary function, on the other hand, revealed normal hormonal levels. All other serological tests, including the HIV test, yielded negative results.

Based on clinical features, neuroimaging, and investigations, a diagnosis of meningitis tuberculosis with cerebral and pituitary tuberculoma was made. Treatment for tuberculosis was initiated with a 2-month combination of isoniazid, rifampicin, pyrazinamide, and ethambutol, followed by 7 months of isoniazid and rifampicin, associated with corticosteroid therapy, and the evolution was marked by the clinical improvement of the patient, even on the radiological level, by the disappearance of the lesion [Figures 2c and d].

DISCUSSION

Tuberculomas in intracranial space can occur at any age, affecting mostly young adults,[32] and the incidence of this pathology has been reduced to 0.15–4% of all intracranial lesions after the emergence of antitubercular drugs.[5] Tuberculomas can involve both adenohypophysis and neurohypophysis, and the extension to the supra-sellar region has been reported, but the mechanism by which the pituitary is affected by *M. tuberculosis* is still ambiguous. The authors have suggested hematogenous spreading or direct extension from the nasal sinuses.[3] According to the 29 pediatric pituitary tuberculosis cases,[1,2,6,8,10,11,14-16,21,27,35,36] the age ranged from 2 years to 17 years old, and the mean age in this category is 11.7 years old, affecting females in 58.6% of cases. Only 10.3% of cases had meningitis tuberculosis as a medical history. The duration of symptoms was 4.2 months, and the clinical features consisted of many manifestations, including neurological-related signs such as headache (75.8%), visual impairment (58.6%), fever (48.2%), vomiting (31%), deterioration of general status, reduced consciousness, seizures, and cranial nerve palsy can be seen as described. On the other hand, there are endocrine signs such as polyuria and polydipsia as frequent signs; amenorrhea, galactorrhea, hyperphagia, obesity, and growth retardation are also reported. Biologically, endocrine dysfunctions in pediatric pituitary TB are common but not always present, which we found plus diabetes insipidus (31%), hypothyroidism (27.5%), hypopituitarism, hypogonadism, hypocortisolism, and growth hormone deficiency. Establishing the radiological diagnosis of pituitary tuberculosis is challenging due to its resemblance to pituitary adenoma, arachnoid cyst, pyogenic abscess, metastasis, or even craniopharyngioma. MRI exploration shows a sellar mass isointense on T1-weighted images showing a thick ring enhancement with gadolinium contrast in the periphery, leaving the central areas hypointense and hyperintense on T2-weighted images corresponding to caseous necrosis. The extension of pituitary tuberculosis can go up to the suprasellar region, optic nerves, and laterally involving the inter-carotid space.[3,19,32] The enhancement aspect of the pituitary stalk being thickened is not specific but considered to be a helpful sign to differentiate pituitary TB from adenoma. On the other hand, there are pathologies of the seller gland that can show the same aspect, such as sarcoidosis, syphilis, idiopathic hypophysitis, neurocysticercosis, granulomatous hypophysitis, eosinophilic granulomas, and lymphomas.[12,22] The presence of parenchymal tuberculomas and nodular leptomeningeal enhancement in basal cisterns and perivascular space helps to suggest the appropriate diagnosis.[29] Tuberculoma can show elevated lipid peaks in MR spectroscopy at 0.9 and 1.3 ppm as found in caseous necrosis, as well as a phosphoserine peak at 3.7 ppm.[26] Other MRI findings in pituitary tuberculoma, include adjacent dural enhancement, sellar floor erosion, and sellar/suprasellar calcification[30] and even the aspect of pituitary apoplexy syndrome was described in one case.[34] Seeing that the diagnosis of pituitary tuberculosis is hardly

Table 1: Published cases of sellar-suprasellar tuberculosis in children.

Authors of pediatric cases	Ethnicity	Age (years old)	Sex	Medical history	Presentation	Duration of symptoms	Endocrinal disturbance	Associated Tuberculosis meningitis	Location
Gucuyener *et al.*, 1992[11]	Turkey	7	Male	Tuberculosis meningitis	Headache fever clouding of consciousness. 3rd/6th/7th nerves paresis. Paresis of right leg memory impairment	3 months	_	_	Suprasellar
Ranjan and Chandy, 1994[24]	India	14	Female	_	Headache vomiting. Low fever diplopia. Bilateral sixth nerve paresis. Menstrual abnormality	2 months	Diabetes insipidus Panhypopituitarism	Meningitis	Sellar/supra sellar
Altunbasak *et al.*, 1995[2]	Turkey	6	Male	Meningitis Tuberculosis	Polyuria and polydipsia	2 months	Diabetes insipidus	_	Suprasellar
Sharma *et al.*, 2000[30]	India	8	Female	Dorsal spine Tuberculosis	Headache fever vomiting blindness.	3 months	_	_	Sellar/supra sellar
		13	Female	Pulmonary Tuberculosis	Headache blindness.	6 months	Hyperprolactinemia	_	Sellar/Clival
		14	Female	_	Headache decrease in vision third nerve palsy	2 weeks	_	_	Sellar/supra sellar
		14	Female	_	Headache fever diplopia 6th N palsy,	4 months	Hypopituitarism	_	Sellar/sphenoid sinus
		14	Female	_	Headache third nerve palsy	1 month	Hypopituitarism	_	Sellar/supra sellar
		16		_	Weight gain generalized weakness	5 months	Hypogonadism	_	Sellar/supra sellar
		17	Female	_	Headache blindness	1.5 months	_	_	Sellar/suprasellar/ Sphenoid sinus
Jain *et al.*, 2001[14]	India	5		_	Headache vomiting fever temporal hemianopia polyuria polydipsia	10 months	Hypothyroidism diabetes insipidus	Meningitis	Supraseller
Stalldecker *et al.*, 2002[33]	Argentina	16	Female	Family history of tuberculosis	Amenorrhea polyuria polydipsia	1.5 month	Diabetes insipidus hypogonadism	Meningitis	Sellar
Ketan *et al.*, 2003[15]	India	15	Female	History of tuberculosis	Headache diminution of vision bitemporal hemianopia amenorrhea. Galactorrhea	2 months	Hypothyroidism	-	Sellar
Dutta *et al.*, 2006[10]	India	13	Male	_	Headache diminution of vision fever lethargy polyuria and polydipsia	_	Diabetes insipidus hypothyroidism hypocortisolism hypogonadism growth hormone deficiency	Meningitis	Suprasellar

(Contd...)

Table 1: *(Continued).*

Authors of pediatric cases	Ethnicity	Age (years old)	Sex	Medical history	Presentation	Duration of symptoms	Endocrinal disturbance	Associated Tuberculosis meningitis	Location
Sanjay *et al.*, 2009[27]	India	15	_	_	_	_	_	_	_
Khursheed *et al.*, 2011[16]	India	8	Male	_	Headache vomiting fever	_	Hypothyroidism Hypocortisolism	Meningitis	Sellar/suprasellar
		6	Female	Meningitis Tuberculosis	Headache vomiting polyuria and polydipsia	2 months	Diabetes insipidus Hypothyroidism Hypocortisolism		Sellar/suprasellar
Daoud *et al.*, 2011[7]	Tunisia	16	Female	_	Headache vomiting fever	_	_	_	Sellar/suprasellar
Verma *et al.*, 2014[34]	India	17	Female	_	Headache vomiting diminution of vision intermittent fever unconscious	2 weeks	_	Meningitis	Sellar/suprasellar
Pruthi *et al.*, 2014[23]	India	8	Male	_	Headache diminution of vision bitemporal hemianopia	3 months	_	_	Suprasellar
Iyer *et al.*, 2015[13]	United kingdom	15	Male	_	Fever confusion seizures polyuria polydipsia	1 month	Diabetes insipidus panhypopituitarism	Meningitis	Suprasellar/ hypothalamus
Muniz *et al.*, 2017[20]	Brazil	2	Female	_	Headache lethargy declined general status	1 month	_	_	Suprasellar
Dayal *et al.*, 2018[8]	India	9	Male	_	Hyperphagia diminution of vision acanthosis Nigerians	3 years	_	_	Sellar/suprasellar
Chellen *et al.*, 2018[6]	United Kingdom	6	Female	_	Headache intermittent fever vomiting lethargy polyuria polydipsia	3 months	Diabetes insipidus	_	Suprasellar
Sarkar *et al.*, 2020[28]	Bangladesh	15	Male	_	Headache fever hemiplegic	6 months	_	_	Suprasellar/ Perimesencephalic
Ziani *et al.*, 2021[36]	Morocco	12	Female	_	Headache decreased vision polyuria polydipsia Declined general status	3 months	Diabetes insipidus hypothyroidism	_	Sellar/suprasellar
Pagad *et al.*, 2022[21]	India	15	Female	_	Headache fever seizure diplopia decreased vision	3 months		Meningitis	Suprasellar
Zhao *et al.*, 2022[35]	China	5	Male	_	Ptosis diplopia third nerve palsy.	_	_	_	Suprasellar
Present case	Morocco	17	Male	_	Headache fever vomiting diminution of vision temporal hemianopia	1 month	_	Meningitis	Suprasellar

N palsy: Nerve palsy

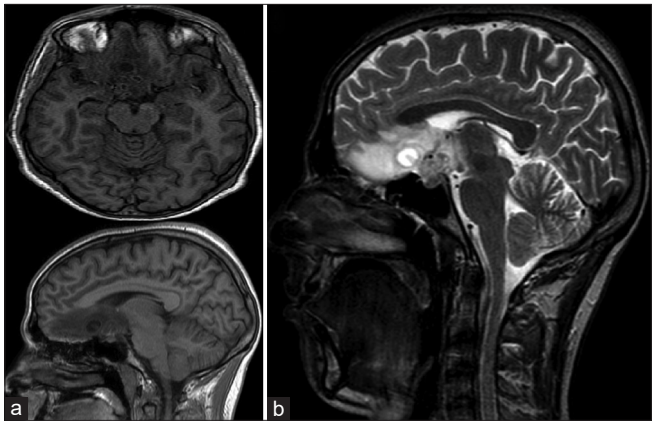

Figure 1: Brain magnetic resonance imaging shows a sellar-suprasellar lesion, (a) isointense to hypointense on T1 and (b) isointense to hyperintense on T2.

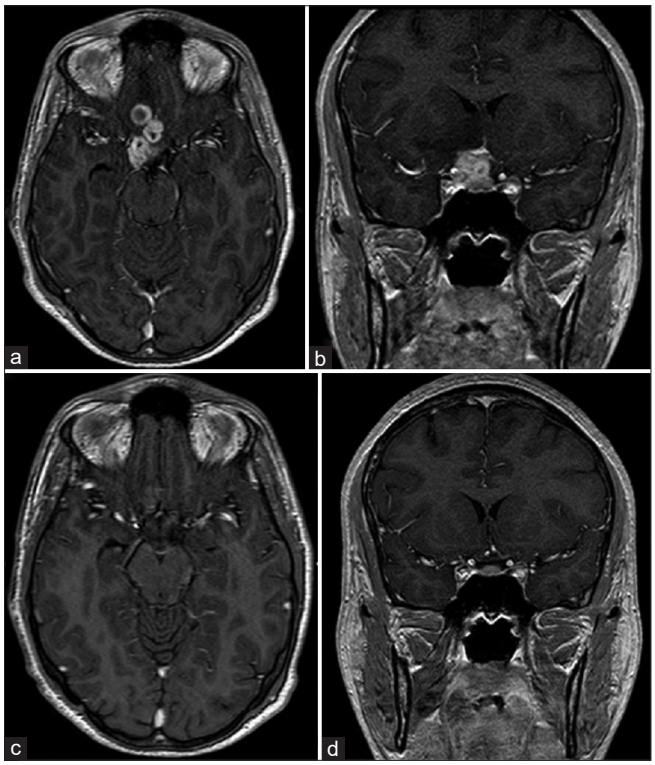

Figure 2: Brain magnetic resonance imaging shows a sellar-suprasellar lesion, (a and b) heterogeneous enhancement with gadolinium is observed on the T1 sequence. (c and d) The lesions exhibit complete resolution following treatment.

ever done through imaging alone, histological confirmation is the main diagnostic modality.[3,4,32] Surgery is required to get samples for pathology study. The best route is the endoscopic endonasal transsphenoidal for the excision of the lesion and decompression of adjacent structures, preventing intracranial contamination. On the other hand, the transcranial approach is used according to the lesion location. The lesion is adherent to the surrounding structure and hardly suckable during the intraoperative inspection, making complete excision difficult.[24] Other alternatives were used in this review, such as using stereotactic brain biopsy and endoscopic transventricular biopsy.[7,16] The histopathological examinations of pituitary tuberculosis reveal epithelioid cells, granulomas with or without caseation necrosis, Langhan's giant cells, and lymphocytes. The reticulin staining aids in demonstrating the loss of the pituitary's normal reticulin pattern. In the immune-histochemistry study with CD68, the presence of epithelioid histiocytes was highlighted, while CD3, CD20, and CD138 can highlight a mixture of T-lymphocytes, B-lymphocytes, and plasma cells. The presence of pus is non-frequent.[3,4,32] The Ziehl–Neelsen stain or PCR culture is used to make the diagnosis in some cases.[3,32] Ideally, avoiding surgery and confirming the diagnosis is the best route, seeing that the treatment of tuberculosis is medical. Preoperative diagnosis in some cases is confirmed by the use of PCR on CSF when affected by tuberculous meningitis.[32] In this review, 58.6% of cases were operated on, and the diagnosis was histological. About 31% had tuberculosis meningitis, considering the lesion as pituitary tuberculosis, while the rest got the diagnosis based on clinical, radiological, and biological context and results. The therapeutic care is based on anti-tubercular drugs for 9–24 months, depending on clinical and imaging follow-up. The therapeutic protocol is based on the use of (isoniazid, rifampicin, ethambutol, and pyrazinamide for the first 2 months, and then, two drugs (isoniazid and rifampicin) for the past 7 months, adjusting the treatment duration according to the evolution of the lesion. With the management of hormonal disorders, some cases require lifelong hormonal replacement. Stalldecker *et al*.[33] used estrogen and progesterone therapy to regain a normal menstrual cycle and even a normal pregnancy. The prognosis is defined by the delay of diagnosis confirmation and the rapid onset of proper treatment.[3]

CONCLUSION

The diagnosis of sellar tuberculomas in children can be challenging as the clinical and radiological presentations can be similar to other pituitary masses. It is crucial to consider pituitary tuberculomas in the differential diagnosis of suprasellar masses, particularly in developing countries where the incidence of tuberculosis is high. Avoiding surgery is the best route to prevent the development of new hormonal deficiencies but sometimes it is a necessary procedure to obtain tissue for diagnosis through biopsy or surgery before starting any specific treatment. The recommended treatment for pituitary tuberculomas is long-term chemotherapy with anti-tubercular drugs, which generally results in a good outcome. However, it is not entirely clear if patients require lifelong replacement

of deficient hormones, so regular follow-up is necessary to monitor for any changes in hormone levels.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The author(s) confirms that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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