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## Case Report

# Tuberculosis presenting with seizure and abdominal pain in a young female: A case report <sup>☆</sup>

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### ABSTRACT

In this case report, a 23-year-old female presented to the Emergency Department with complaints of abdominal pain, weight loss, progressive headaches, and an episode of seizure-like activity. Computerized tomography abdomen/pelvis revealed multilobulated ovarian masses and scattered peritoneal thickening. A brain Magnetic resonance imaging was ordered and demonstrated a peripherally enhancing intracranial mass. The brain lesion was resected and pathology revealed necrotizing granulomatous inflammation. Cultures were positive for acid fast bacilli. The patient was diagnosed with tuberculosis and treated with multidrug therapy. Upon further questioning, the patient had recently traveled to a tuberculosis endemic region. This case highlights the importance of an in-depth history and physical exam as a means to a more complete differential diagnosis considering the age of the patient and the findings on imaging.

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## Introduction

Extrapulmonary tuberculosis (Tb) is becoming increasingly more common among total Tb cases especially with the rise of HIV [1]. In 2019, 16% of incident cases of Tb had some extrapulmonary involvement [2]. Extrapulmonary Tb can be a very difficult diagnosis to make because it can mimic symptoms of a myriad of other diseases depending on the location of its involvement. Findings can be subtle and typical symptoms of Tb like fever, night sweats and hemoptysis may be absent. We report this case to discuss clinical and radiologic features of

extrapulmonary tuberculosis involving the brain in a young female.

## Case presentation

A 23-year-old female presents to the Emergency Department due to seizure-like activity consisting of confusion, eye fluttering, facial tics, and diffuse weakness. She reported progressive right-sided headaches, weight loss during the past 6 months, and occasional abdominal pain. Past medical his-

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**Fig. 1 – CT abdomen/pelvis. (A): Axial contrast enhanced image demonstrates multiple peripherally enhancing, centrally low attenuating fluid collections/masses in the pelvis. (B): Coronal contrast enhanced image demonstrating loculated pelvic masses and distention of the fallopian tubes with fluid.**

tory is significant for polycystic ovarian syndrome. The patient was afebrile and hemodynamically stable with episodes of confusion and multiple rounds of emesis. After management with steroids and levetiracetam, physical exam was negative for a focal motor or sensory deficit. Computerized tomography (CT) abdomen/pelvis demonstrated enlarged multiloculated peripherally enhancing lesions involving the ovaries and fallopian tubes (Fig. 1). Scattered peritoneal thickening of the pelvis with free fluid was also noted. Due to confusion and seizure like activity, brain Magnetic resonance imaging (MRI) was performed and demonstrated a  $3.2 \times 2.5$  cm centrally necrotic lesion in the right parieto-occipital region with thick, nodular peripheral enhancement and surrounding vasogenic edema (Fig. 2). The lesion was centrally T2 hypointense. Diffusion weighted imaging (DWI) with apparent diffusion coefficient (ADC) shows a subtle rim of peripheral restricted diffusion in the region of enhancement. There was no evidence of associated hemorrhage.

The patient underwent a right parietal-occipital craniotomy with gross total resection. The pathology of the lesion showed the presence of necrotizing granulomatous inflammation of the brain and leptomeninges. Acid fast bacillus tissue stain and Tb PCR tests were negative. Follow-up cerebrospinal fluid studies were also negative for acid fast bacillus stain and Tb PCR. Her quantiferon gold test was intermediate.

After the surgery, a more comprehensive history was obtained and the patient mentioned that her symptoms started after returning from a trip to India. Gynecology oncology work-up revealed a slightly elevated CA-125, which was appropriate for her age, but no elevation in other tumor markers such as lactate dehydrogenase, alpha-fetoprotein, human chorionic gonadotropin, or carcinoembryonic antigen. Given her risk factors (recent travel to India, weight loss, and disseminated findings), she was treated empirically with rifampin, isoniazid, pyrazinamide, and ethambutol and discharged with these medications. Send out cultures of the brain lesion later showed growth of acid fast bacilli, which in the context of her clinical symptoms and her imaging findings indicate extrapulmonary Tb with intracranial tuberculoma. The patient has im-

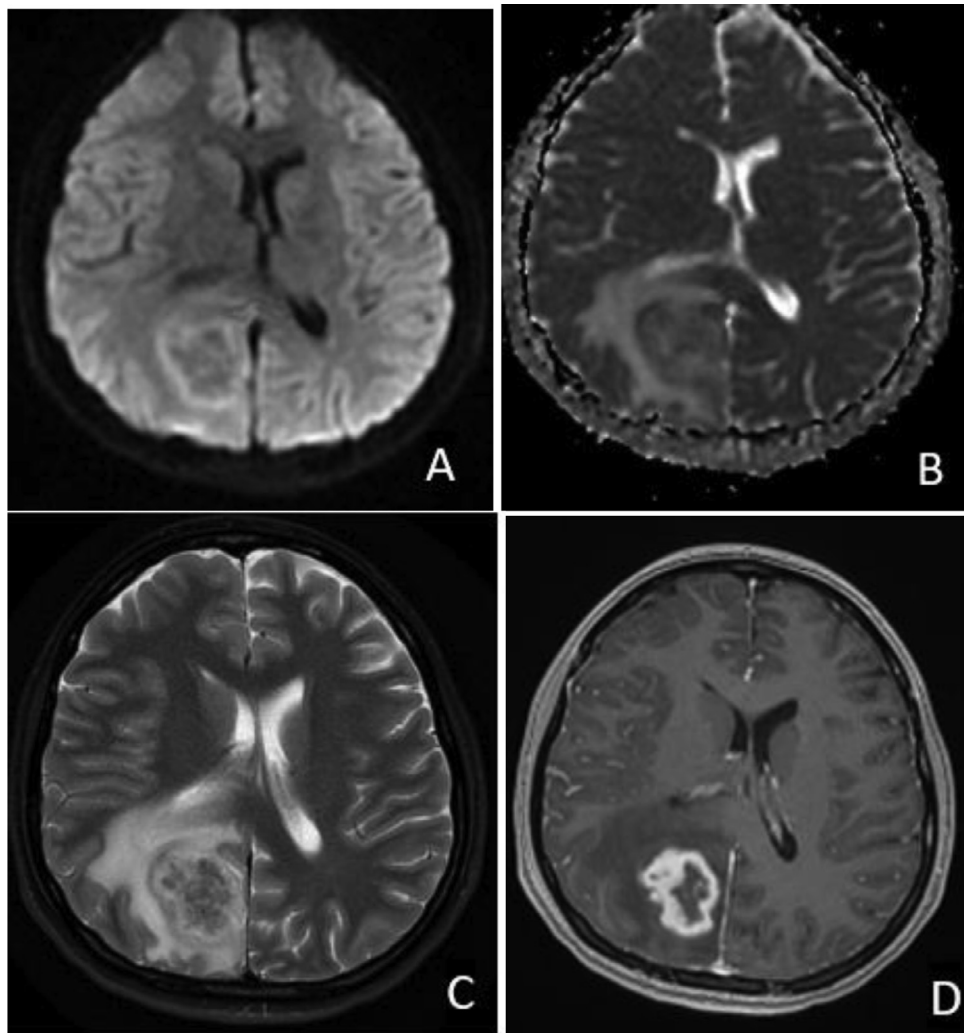
proved clinically with follow-up imaging of her pelvis demonstrating decreased size of the bilateral multiloculated adnexal lesions.

## Discussion

The patient's brain lesion in the context of bilateral pelvic masses and diffuse peritoneal thickening provides support for a disseminated process that is either neoplastic or infectious in etiology. There are many possibilities for the patient's brain lesion, including metastasis of a primary abdominal or pelvic tumor, a primary brain neoplasm, or brain abscess or other intracranial infection (such as tuberculoma). Clinical evidence combined with imaging studies and histologic findings helped narrow down the diagnosis of extrapulmonary Tb.

A tuberculoma in the brain can develop by hematogenous spread of Tb. A tuberculoma presents as a peripherally enhancing lesion with surrounding vasogenic edema and represents a localized granulomatous reaction in the tissue. A central calcification leading to a targetoid appearance can also be found in some cases [3]. MRI findings of tuberculomas differ based on whether they are caseating or non-caseating. Non-caseating tuberculomas typically are hypointense or isointense on T1 and hyperintense on T2 weighted imaging [4]. Caseating tuberculomas that have a solid center are hypointense or isointense on T1 and T2 weighted imaging [4]. Caseating tuberculomas with liquid centers demonstrate T2 hyperintensity [4]. Tuberculomas can progress from non-caseating to caseating over time. In this case, the primary source of infection was pelvic Tb. A CT of the chest was performed after abdominal imaging and was negative.

The primary differential diagnosis for a solitary enhancing brain mass in the context of pelvic masses would be a parenchymal metastasis. Half of brain metastases are solitary at the time of diagnosis [11]. Most commonly, they are located in the supratentorial brain at the grey-white junction secondary to hematogenous spread. Only 15% of metastasis



**Fig. 2 – MRI of the brain. (A, B): DWI and ADC map. Mass in the right parieto-occipital region demonstrates peripheral rim of faint increased signal on DWI with subtle signal hypointensity on ADC map consistent with diffusion restriction. (C): T2 weighted image demonstrates central heterogeneous T2 hypointensity. (D): Fat suppressed thin slice contrast enhanced T1 weighted image demonstrates thick, nodular rim of peripheral enhancement in the corresponding location of the diffusion restriction.**

occur in the posterior fossa [12]. Most metastases exhibit complete ring enhancement, with marked surrounding vasogenic edema. This patient's abdominal imaging findings raise the possibility of a primary ovarian neoplasm that metastasized to the brain. Brain metastasis is a rare but increasingly more common complication of ovarian cancer [13]. However, a majority of the patients had multiple lesions and were older than 50 years [14]. Given her age, pelvic tumors with brain metastasis would be rare.

Secondarily included in the differential would be an infectious process, such as abscess. It can be difficult to differentiate tuberculomas from pyogenic or fungal brain abscesses. Brain abscesses can occur due to a variety of different pathogens and are more common with immunosuppression that predisposes to hematogenous spread or a nidus of infection (eg, dental, middle ear, or sinuses) that allows for contiguous spread. Pathogens of an abscess are based on patient risk

factors such as *Staphylococcus aureus* with prior neurosurgical procedures or atypical fungal infections and *Toxoplasmosis* in cases of immunosuppression [5]. Typical MRI findings of an abscess include central T1 hypointensity and T2 hyperintensity, and peripheral enhancement. The T2 hyperintense center typically restricts diffusion [5]. These features can make abscesses appear similar to a non-caseating tuberculoma or a caseating tuberculoma with a liquid center. Tuberculomas can also demonstrate peripheral enhancement with central necrosis [4,6]. Our case is most likely a caseating tuberculoma with a solid center as evidenced by its central T2 hypointensity which is a feature that helps differentiate from a typical brain abscess.

Lastly, this lesion could have represented a primary brain neoplasm, although considered less likely given the abdominal CT findings. Given the degree of peripheral enhancement and surrounding edema, the top differential consider-

ation regarding primary brain neoplasms would be a high-grade glioma. While peripheral enhancement is a common feature of tuberculomas, abscesses and high-grade gliomas, DWI can help differentiate these lesions further. Abscesses tend to demonstrate diffusion restriction in the region of central necrosis [7]. DWI imaging in our case demonstrated subtle diffusion restriction in the region of the peripheral enhancement. High grade gliomas, such as glioblastomas can look similar to tuberculomas on MRI. However, the outer rim of a glioblastoma is hypercellular, which results in significant diffusion restriction. This patient's lesion in our case had a subtle rim of restricted diffusion. In addition, high grade gliomas typically have associated hemorrhage in addition to the peripheral enhancement whereas our case had no associated hemorrhage [8].

More advanced neuroimaging techniques like magnetic resonance spectroscopy can also provide insight in identifying intracranial tuberculomas and differentiate them from other peripherally enhancing lesions like abscesses and neoplasms. Tuberculomas characteristically show a very high lipid peak, whereas abscesses have elevated levels of amino acid peaks in spectroscopy [15]. Increased choline can be found in both tuberculomas and tumors, but the choline and/or creatinine ratio tends to be much higher in malignancy [16]. Magnetic resonance perfusion studies have also been shown to differentiate tuberculomas from malignancy. The walls of metastatic lesions show a higher elevation in relative cerebral blood volume (rCBV) compared to those of tuberculous lesions with a rCBV cutoff value of at least 3.745 to differentiate between the two [17]. In dynamic susceptibility imaging, a complete hypointense peripheral ring has been shown to favor a tuberculoma compared to gliomas and metastatic brain lesions [18].

The diagnosis of Tb is confirmed with an acid fast bacillus stain or culture, with PCR testing of the isolated tissues or with histologic evidence of caseating granulomas [9]. Negative results of any of these tests do not exclude disseminated tuberculosis and should not delay treatment in cases of high clinical suspicion. In our case, initial acid fast stain and PCR testing was negative, but the cultures were eventually positive.

Tuberculomas can be removed with a craniotomy. In general, extrapulmonary Tb is treated similar to pulmonary Tb. It responds well to the regimen of rifampin, isoniazid, pyrazinamide, and ethambutol for at least 2 months followed by a regimen of rifampin and isoniazid for 4-7 additional months [9]. Adjunctive corticosteroids can help in cases of tuberculosis infections of the central nervous system and pericardium [10]. However, mortality is still significant with poor prognosis in patients with altered mental status, liver cirrhosis, and immunosuppression.

Our case was unique because of the age of the patient, the degree of Tb involvement in the brain and pelvis, and the lack of history of any immunosuppressing conditions or medications. A comprehensive evaluation for tuberculosis should be done when evaluating patients with subacute or chronic symptoms especially with recent travel history to Tb-endemic areas even if the patient does not have typical pulmonary or infectious symptoms. A multimodal approach with imaging and tissue sampling can provide valuable information for the diagnosis. Early diagnosis and treatment can lead to a favor-

able prognosis especially in healthier and younger patients like in this case even with widespread involvement of tuberculosis.

## Conclusion

Extrapulmonary tuberculosis can mimic many diseases depending on specific organ involvement and can often be a subacute or chronic process without any classical signs of infection. A high index of suspicion is needed as it can present even in cases where the patient is not immunosuppressed. Early diagnosis and appropriate management require a full understanding of the different ways that Tb can present and a synthesis of clinical, radiologic, and histologic evidence.

## Patient consent

IRB exempt with determination of Non Human Research. No consent needed.

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