



# Cerebral venous thrombosis and miliary tuberculosis: a case report from Syria

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**Background:** Cerebral venous thrombosis (CVT) is a relatively common disease. Risk factors for CVT include pregnancy, cancer, autoimmune diseases, and hypercoagulation. Acute and chronic meningitis are also considered predisposing conditions for CVT. Cases of CVT associated with tuberculous meningitis and miliary tuberculosis (TB) are rare in the medical literature, and here the authors report the first case report from Middle East.

**Case presentation:** The authors present a 33-year-old female patient diagnosed initially with CVT to discover the presence of tuberculous meningitis and miliary TB.

**Clinical discussion:** CVT is an urgent condition and the outcome is usually good when treated quickly. The mechanisms of TB causing thrombosis are endothelial injury, slow venous flow, and increased platelet aggregation. The clinical presentation of CVT can be confused and falsely attributed to TB Meningitis.

**Conclusion:** Infectious causes of CVT should always be remembered, especially TB should be in mind in developing countries.

**Keywords:** cerebral venous thrombosis, miliary tuberculosis, tuberculosis, tuberculous meningitis

## Case presentation

A 33-year-old female patient was admitted to the neurology department with a complaint of confusion with sleepiness. Before 5 days, she had suffered from occipital headache that gradually increased until it became severe and accompanied with nausea, vomiting, and blurred vision in both eyes. After 2 days, she became confused and not responded. The patient's family reported having an unmeasured fever, chills, lack of appetite, and a weight loss of 10 kg in the last 2 months. Her medical history was normal except that she was a smoker of 20 packet/year.

On physical examination, she was not oriented to time, place or people, and Glasgow scale was 13/15. She had a neck stiffness with a positive Kernig sign. On eyes examination, she could not move her eyes to the lateral side bilaterally, which was consistent with paralysis of the sixth cranial nerve on both sides. She also had bilateral optic nerve oedema. We could not accurately determine the visual acuity due to the decreased consciousness. The rest of cranial nerves examination was normal. Strength,

## HIGHLIGHTS

- Infectious causes of cerebral venous thrombosis (CVT) should always be remembered.
- Acute and chronic meningitis are considered predisposing conditions for the occurrence of CVT.
- Tuberculosis should be in mind in developing countries.
- There is overlap in the clinical picture between CVT and tuberculous meningitis.

and reflexes were normal without focal signs. There were general lymph nodes, the largest of which was under the left jaw about 1.5 cm and small nodes in the armpits, without hepatomegaly or splenomegaly.

Brain MRI showed a complete left transverse sinus thrombosis with signs of thrombosis in the middle of the superior sagittal sinus with poor flow in the right transverse and sigmoid sinuses (Figs. 1, 2). A chest X-ray was performed and showed bilateral infiltrations in (Fig. 3). A neck and chest computerized tomography showed several enlarged lymph nodes below the jaw, the largest of which (21 × 11 mm in the left, and in the right (16 × 10) mm. Many nodes in front of the trachea and the largest of which is 1.5 cm. Cavernous formations at the tops of the lungs, the largest of which is on the left side and measured (22 × 24) mm. Nodular pulmonary infiltrations are obvious in both lungs and the diagnosis was miliary tuberculosis (TB) (Figs. 4, 5).

Laboratory tests showed elevated erythrocyte sedimentation rate about 60 and C-reactive protein was 3.6 mg/dl. Rest of haematological and biochemical investigations were normal. HIV test is negative. Cerebrospinal fluid (CSF) analysis showed an increased cell count of 210/mm<sup>3</sup> (normal < 5) with 54% lymphocytes, glucose of 29 mg/dl (with serum glucose of 104 mg/dl), and total protein of 86.4 mg/dl (normal < 40). Lactate was 126 mg/dl and adenosine deaminase (ADA) was 9.3. Bacterial and fungal cultures were negative. Polymerase chain reaction of

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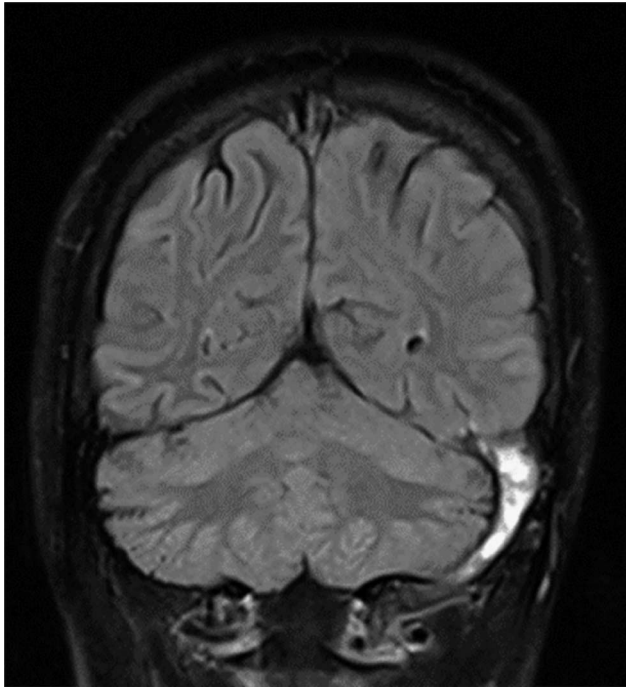
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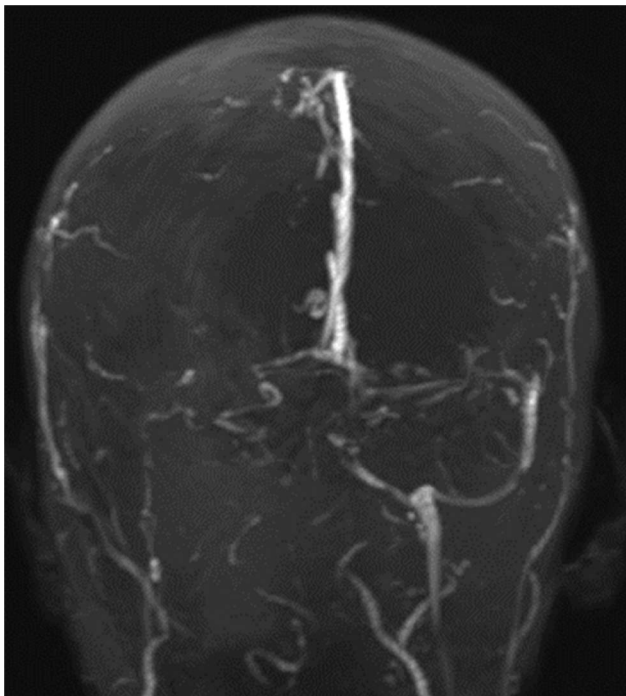
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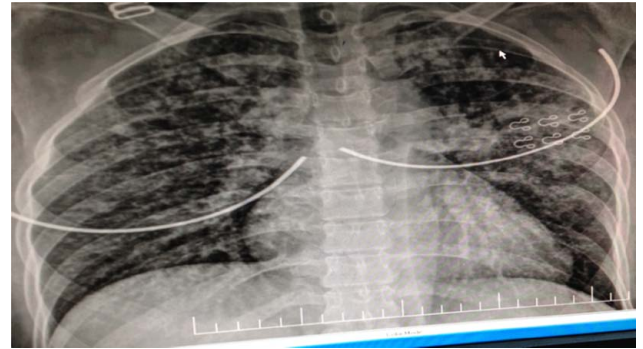
**Figure 1.** Coronal flair magnetic resonance image demonstrates high-intensity in the left transverse sinus compatible with thrombosis.

TB on the CSF was positive. Sputum and CSF cultures for TB were positive.

We started treatment with isoniazid, pyrazinamide, rifampicin, and ethambutol . Dexamethasone was also added. We started



**Figure 2.** Magnetic resonance venography demonstrates a lack of flow in the left and right transverse sinuses.



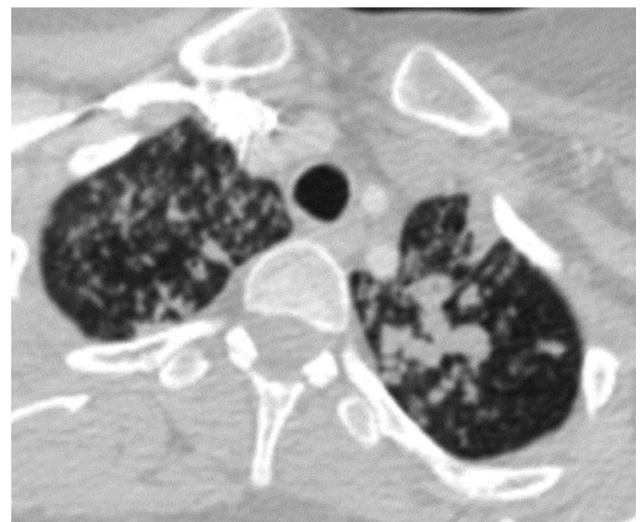
**Figure 3.** Chest X-ray demonstrates bilateral infiltrations in both lungs.

with low molecular weight heparin and then performed a warfarin bridge. Acetazolamide was also prescribed. Ten days later, the patient was discharged from the hospital in a good condition. After 2 months the patient was in excellent condition with complete absence of symptoms and improvement in appetite and weight. After that, she continued on treatment for 7 months.

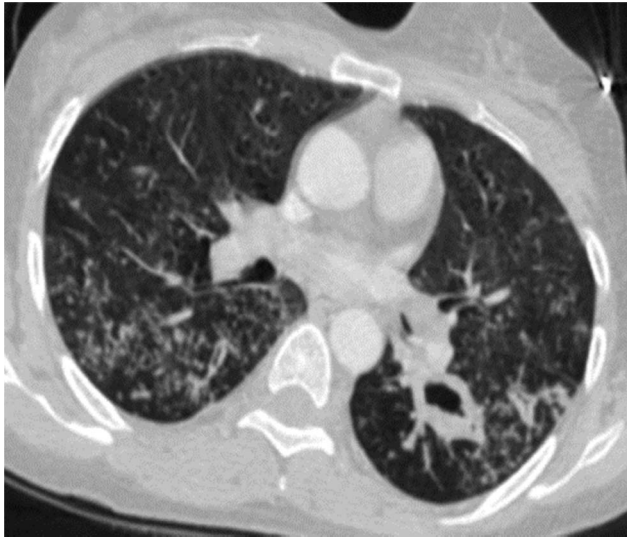
### Discussion

TB has become a rare disease in most countries while remaining relatively common in developing countries and causes high rates of morbidity and mortality. In 2020, almost 10 million people infected with TB worldwide, and 1.5 million people died from it<sup>[1]</sup>. Worldwide, TB is the 13th leading cause of death<sup>[1]</sup>.

TB infection in the nervous system may manifest as meningitis, tuberculomas, hydrocephalus, vasculitis, stroke, and venous sinus thrombosis<sup>[2]</sup>. Approximately 10% of patients with TB generally develop central nervous system involvement<sup>[3]</sup>. The people most likely to be infected with TB are immunosuppressed<sup>[4]</sup>. In endemic areas, tuberculomas are the cause of up to 30% of intracranial masses<sup>[5]</sup>. Tuberculous meningitis typically presents in a subacute clinical picture, with nonspecific prodromal symptoms,



**Figure 4.** Chest computerized tomography demonstrates nodular pulmonary infiltrations.



**Figure 5.** Chest computerized tomography demonstrates cavernous formations.

with mean duration of symptoms is more than 5 days<sup>[6]</sup>. The most common symptoms are headache, vomiting, fever, photophobia and weight loss<sup>[7]</sup>. The modified Medical Research Council (MRC) staging system is used to classify patients at the initial presentation to determine the severity<sup>[8]</sup>. CSF culture of TB is the gold standard for diagnosis. Traditional cultures can take 2–8 weeks<sup>[9]</sup>. Increasing the volume of CSF sent for culture to a minimum of 6 ml and increasing time for examination of CSF smears, as well as repeating lumbar puncture, can improve the yield<sup>[9]</sup>. Polymerase chain reaction TB is also a TB diagnostic manner. Its sensitivity and specificity in the CSF are 56% and 99%, respectively<sup>[10]</sup>. ADA is released by T cells during cell-mediated immune response to bacilli. The sensitivity and specificity of the ADA assays were, respectively, 79% and 91%<sup>[11]</sup>. Importantly, ADA levels can be elevated during bacterial meningitis also<sup>[12]</sup>.

Current WHO guidelines recommend the same regimen of treatment for pulmonary TB (isoniazid, rifampicin, ethambutol, and pyrazinamide) with an extension to 10 months of therapy for central nervous system TB<sup>[13]</sup>. The addition of dexamethaxone to antibiotics reduces mortality and sequelae of tuberculous meningitis in adults and children<sup>[14]</sup>.

The mechanism of TB causing thrombosis is endothelial injury, slow venous flow, and increased platelet aggregation<sup>[15]</sup>. Mycobacterium TB-infected microglia release several cytokines and chemokines like TNF- $\alpha$ , IL-6, IL-1 $\beta$ , CCL2, CCL5, and CXCL10<sup>[16]</sup>.

A review of literature showed only few cases of cerebral venous thrombosis (CVT) and TB. In one study published in 2022, 30 patients with tuberculous meningitis were collected, two female patients developed venous sinus thrombosis (6.7%) and improved on anticoagulation therapy<sup>[17]</sup>. In another study by Bansod *et al.*<sup>[18]</sup>, abnormal MRV findings were found in 12 out of 107 (11.2%) Tuberculous Meningitis patients. Guenifi *et al.*<sup>[19]</sup>, found three patients suffered from CVT out of 61 patients of Tuberculous meningitis.

## Conclusion

Infectious causes of CVT should always be remembered. Usually transverse sinus thrombosis occurs following mastoiditis. Its

occurrence with Tuberculous meningitis is rare. There is also overlap in the clinical picture. So, the presence of associated venous sinus thrombosis may be overlooked and all symptoms attributed to tuberculous infection, and the opposite may also occur. For this reason, MRI and CSF analysis are important for making the accurate diagnosis.

The work has been reported in line with the CARE criteria<sup>[20]</sup>.

## Ethics approval and consent to participate

This article does not contain any studies with human participants or animal performed by any of the authors.

## Consent to publish

The patients signed an informed consent form to publish this case report.

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There is no funding.

## Author contribution

I.L. collected data and wrote the paper. G.H. drafted the work or substantively revised it.

## Conflicts of interest disclosure

The authors declare that they have no competing interests.

## Availability of data and materials

The data that support the findings of this paper are available from the corresponding author, upon reasonable request.

## Provenance and peer review

Not commissioned, externally peer-reviewed.

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