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### Miliary TB disease with TB meningitis

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# Miliary TB Disease with TB Meningitis

## A form of TB that is easy to misdiagnose and is often fatal

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### Case Presentation

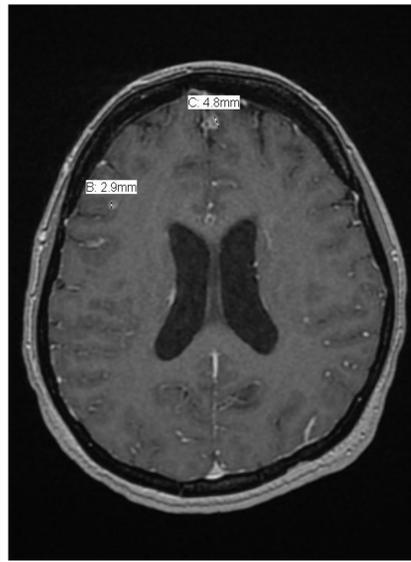
- > **HPI:**
- > 35 year old woman from Vietnam without significant medical history whom presented to the ED for headache and fever.
  - > Headache x 2 weeks. Localized to occipital region and spans down back to tailbone. Also fever 102F for the past month.
  - > Evaluated in the ED 10 days prior to presentation for this headache and diagnosed with an acute viral syndrome given normal labs and head CT.
  - > A few days later, she began having blurry vision, nausea, vomiting, lethargy and had incoherent speech. She has not had any URI symptoms, cough or hemoptysis.
  - > Re-evaluated at an urgent care and they noted some neck stiffness and given her symptoms and exam they sent to the emergency room for further workup.
  - > Pt has never been exposed to TB to her knowledge, but she did grow up in Vietnam. No prior positive TB screening testing to her knowledge. Married, non-smoker, non-drinker, and no history of IVDU. Works in a nail salon.
- > **Physical Examination:**
  - > VS: T:103.1F / 39.5C BP: 148/97 HR: 124 RR:16 SpO2: 96% on RA
  - > Gen: Wobbly gait, tired appearing
  - > Neck: Stiff, limited neck flexion
  - > ROE unremarkable

### Hospital Course

- > **Workup in the ED:**
  - > **Notable labs:**
    - > CSF from LP:
      - > 258 WBC (83% PMN and 17% lymphs), 518 RBCs, protein 258 (nml = 15-60), glucose 38 (33%) (nml level 8-80 and 60-70%).
    - > Sodium 121, mild transaminitis
  - > **ID recommendations:**
    - > "From LP alone, DDx includes "early" viral meningitis, vs bacterial (pyogenic vs AFB vs other atypical pathogens such as Listeria, Brucella, syphilis) vs Cryptococcus. Other causes such as medication induced or autoimmune (SLE etc) are possible."
    - > Started on CTX, vancomycin, and acyclovir
    - > Follow labs for etiology: HIV, syphilis, cryptococcus, cultures including AFB, viral including HSV and enterovirus
    - > CXR to look for evidence of prior TB
  - > **Follow up CXR:**
    - > "Diffuse pulmonary nodularity. The differential would include respiratory bronchiolitis, miliary tuberculosis and other fungal infections, hypersensitivity pneumonitis and viral infection."
  - > After CXR, she was placed on airborne precautions and in a reverse flow room.
  - > She also received a brain MRI:
  - > **MRI brain findings:**
    - > "Small ring-enhancing lesions in the left frontal cortex and right frontal cortex. Differential considerations are quite broad but includes infectious and neoplastic etiologies. No brain edema to suggest viral encephalitis"
  - > **The following day:**
    - > CSF resulted as positive for TB by PCR, confirming the diagnosis.
    - > Treatment was immediately started.
      - > Started isoniazid (INH) 300mg/ rifampin (RIF) 600 mg / ethambutol (EMB) 25mg/kg / pyrazinamide (PZA) 25 mg/kg ("RIPE")
      - > Prednisone 60 mg qd for 2 weeks followed by taper
      - > Pyridoxine 50 mg qd
      - > Discontinued ceftriaxone, vancomycin, and acyclovir
      - > Continued airborne precautions
  - > **Contacted by county health department:**
    - > Even though we had a diagnosis, needed sputum for AFB smear/cx to determine level of contagiousness. Unable to produce sputum, even with induction.
    - > Had bronchoalveolar lavage =
      - > 3+ (moderate) Mycobacterium tuberculosis

#### MRI Brain

**Fig 1.** MRI Brain w/o contrast: "Small ring-enhancing lesions in the left frontal cortex and right frontal cortex. Differential considerations are quite broad but includes infectious and neoplastic etiologies. No brain edema to suggest viral encephalitis"



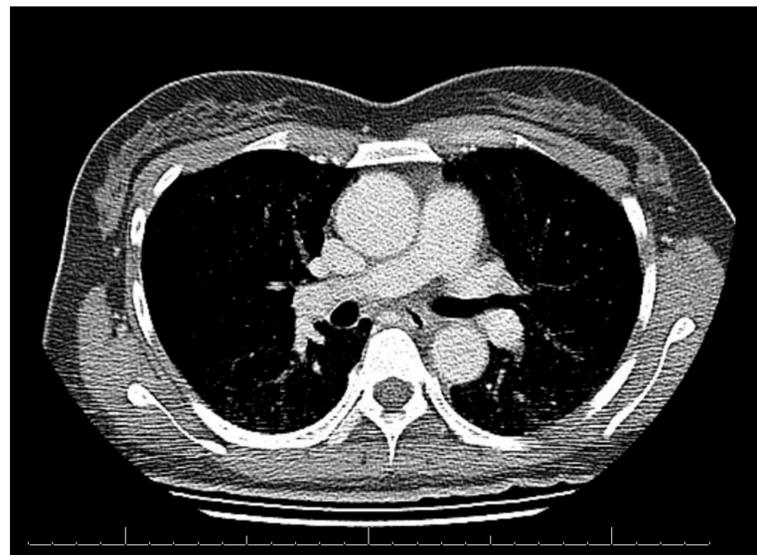
#### CXR

**Fig 2.** "Diffuse pulmonary nodularity. The differential would include respiratory bronchiolitis, miliary tuberculosis and other fungal infections, hypersensitivity pneumonitis and viral infection."



#### Chest CT

**Fig 3.** Diffuse, extensive micronodules throughout the bilateral lungs, with homogeneous distribution. These findings are nonspecific with broad differential considerations including, but not limited to, infectious etiologies, including disseminated tuberculosis and fungal infection, pneumoconiosis, hypersensitivity pneumonitis and sarcoidosis



### Discussion

- > **TB CLASSIFICATION:** Tuberculosis classified according to site of disease as pulmonary or extrapulmonary;
- > **TREATMENT:** "RIPE": isoniazid (INH) 300mg/ rifampin (RIF) 600 mg / ethambutol (EMB) 25mg/kg / pyrazinamide (PZA) 25 mg/kg
- > **MILIARY TB OVERVIEW:**
  - > Miliary disease is classified as both extrapulmonary & pulmonary.
  - > "Miliary" refers to the CXR appearance of millet seeds scattered throughout the lung.
  - > Characterized by a large amount of TB bacilli, although it may easily be missed, and is fatal if left untreated.
- > **INCIDENCE/PREVALENCE:** Fewer than 2 percent of all TB cases demonstrate miliary disease
- > **OUTCOMES:** Mortality rate is between 15 to 30%
  - > One of the main causes for high mortality includes late detection of disease caused by non-specific symptoms
- > **RISK FACTORS:** Most common in infants and children younger than 5 years of age and in severely immunocompromised persons.
- > **PATHOGENESIS:** Can arise as a result of progressive primary infection vs reactivation of a latent focus with subsequent spread. TB spreads from the pulmonary system to the lymphatic system and eventually the blood stream, but the mechanism by which this occurs is not well understood
- > **ORGANS INVOLVED:** Miliary TB may be detected in an individual organ, including the brain; in several organs; or throughout the whole body.
  - > Up to 25% of patients with miliary TB may have meningeal involvement.
- > **DIAGNOSIS:**
  - > \*Culture: Gold standard for confirming diagnosis of TB. Culture all specimens, even if smear or NAA negative. Results in 4–14 days. Collection methods include coughing, sputum induction, bronchoscopy, gastric aspiration.
  - > AFB smear classification
  - > NAA/PCR testing
  - > Drug-susceptibility testing
  - > \*\*For extra pulmonary TB: Variety of clinical specimens other than sputum can be submitted
- > **RADIOGRAPHIC IMAGING:**
  - > **CXR :** Miliary pattern on the chest radiograph is often the first clue suggestive of miliary TB. Pros: ready availability, capacity to differentiate latent TB from active TB. Cons: low sensitivity and specificity, not confirmatory.
  - > **CT Chest:** Contrast-enhanced CT scans are better for detecting additional findings, such as intrathoracic lymphadenopathy, calcification, and pleural lesions.
  - > **MRI of the Brain:** Miliary CNS TB is usually associated with TBM and appears at MRI as multiple tiny, hyperintense T<sub>2</sub> foci that homogeneously enhance on contrast enhanced T<sub>1</sub>-weighted images. The MRI is particularly helpful in identifying and delineating the extent of tuberculomas and cold abscesses and monitoring the response to treatment.
- > **DIFFERENTIAL DIAGNOSIS OF MILIARY TB PATTERN ON CXR:**
  - > Miliary tuberculosis (TB), histoplasmosis, sarcoidosis, pneumoconiosis, bronchoalveolar carcinoma, pulmonary siderosis, and hematogenous metastases from primary cancers of thyroid, kidney, trophoblast, and some of the sarcomas.

### Conclusion

- > TB meningitis is a rare and dangerous entity that can be easily missed unless there is a high index of suspicion
- > Early diagnosis and treatment is key to prevent mortality in these patients

### References

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