

# Extra-Pulmonary Pott's Disease with Intracranial Manifestations: An Inmate's Story

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## Abstract

Tuberculosis is a chronic disease that is the leading cause of infectious disease deaths worldwide. In developed countries, incidences are minimal and however, complicated manifestations of tuberculosis are becoming a trend within the prison system. This case report illustrates a patient within the United States correctional system who demonstrated a rare infection of tuberculosis despite absent pulmonary findings. Our Patient was a 39-year-old inmate presenting with fatigue, night sweats, weight loss, and progressive dyspnea. Pulmonary imaging and cultures of sputum were negative for tuberculosis. Further imaging and laboratory workups demonstrated extensive spinal infections along with intracranial lesions that were positive for tuberculosis. Neurosurgery declined operative medicine due to advancement of the disease and appropriate antibiotic therapy was immediately initiated. Tuberculosis continues to exist in developed countries with an increased emergence of complicated cases. Furthermore, incarceration dramatically increases an individual's risk of worse infections. The clinical impact involves promoting awareness for a need to identify and prevent continued spread of disseminated infections. Therefore, further investigations of this trend in prisons are worth considering.

## Keywords

Pott's Disease, Tuberculosis, Spinal TB, Tuberculosis Meningitis

## 1. Introduction

Tuberculosis (TB) is a highly contagious chronic disease caused by the bacillus *Mycobacterium tuberculosis* (*M. tuberculosis*). TB has significant global morbidity, currently affecting over 2 billion people worldwide [1]. This airborne disease classically affects the lungs; however, it may also infect the brain, spine, kidneys, and intestines. Despite our abilities to cure this disease, a 2017 study revealed that 1.6 million people died from TB, subsequently ranking it as the lead-

ing cause of infectious disease deaths worldwide [2]. Currently, developing countries account for the largest infection rates whereas cases in the U.S. continue to remain low at 2.7 cases per 100,000 people [3]. Therefore, TB is often overlooked in U.S. medical communities because of its relatively low prevalence. The likelihood of spreading TB is linked to overcrowded unsanitary living conditions and poor populations without access to medical care. A similar environment with such shared attributes currently exists in America's prison system. Although TB is on the decline due to advancements in medical interventions, the incidence of cases in the U.S. prison population remains a consistent burden. This case study illustrates a rare manifestation of non-pulmonary spinal TB with cerebral involvement.

## 2. Case

Our patient was a 39-year-old male with a past medical history of essential hypertension, inguinal hernia, and polydrug use who presented to the outside prison hospital for persistent fever, chills, and progressive dyspnea upon exertion following a diagnosis of Influenza B Pneumonia. He was an inmate from 2003-2006 and then re-incarcerated in 2012. The patient reported approximately 4 months of intermittent fevers accompanied by 20 lb unintentional weight loss. He was transferred to the University of Texas Medical Branch (UTMB) for elevated care. The patient reported a long history of night sweats beginning outside the correctional facilities and starting again 18 months prior to admission. He denied a history of TB and was annually tested with positive protein derivative tests until a year ago along with a negative HIV test. Furthermore, he had a non-productive cough for the past 3 - 4 days and denied seizures, syncope, hemoptysis, chest pain, nausea/vomiting, and dysuria.

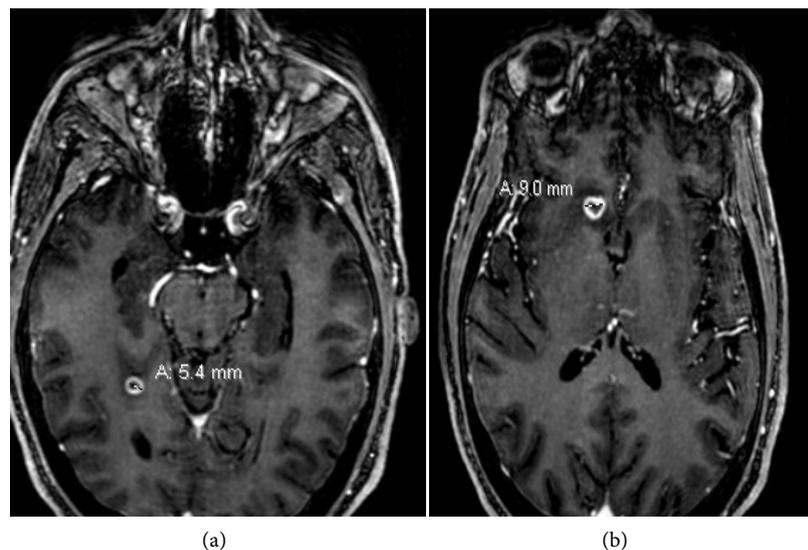
Additionally, he began experiencing new left leg and left shoulder dragging along with slurred speech which he said was getting progressively worse since using heavy drugs in 1999. Impaired speech, a consistent headache, and gait disturbances were concerning for CNS involvement. Other deficits were not observed after a neurological workup and neurological consult recommended advanced imaging.

Outside hospital imaging demonstrated a loculated right pleural effusion and right-sided pneumonia. New imaging from a chest CT scan found a large destructive posterior mediastinal process involving the central spinal canal at the T9 level (**Figure 1**). The patient's cough was non-productive, and after multiple attempts, induced sputum samples were obtained. However, sputum samples were acid-fast bacteria (AFB) stain, culture, and PCR negative. Nonetheless, both a biopsy of the T8 vertebra and a paraspinal fluid aspirate were AFB stain and culture positive for *M. tuberculosis*, confirming our diagnosis of Pott's disease (PD).

An MRI head was also obtained due to concerns for cerebral involvement in our patient with slurred speech and unsteady gait. The MRI demonstrated ring-enhancing lesions in multiple lobes of the brain which were concerning Tuberculous meningitis (TBM) (**Figure 2**). Neurosurgery was consulted because of the



**Figure 1.** MRI demonstrating multiloculated paraspinal collection extending from T6 to T11 with involvement of multiple vertebral bodies.



**Figure 2.** (a) 9 mm ring-enhancing lesion in the right caudate with mild surrounding edema; (b) 6 mm ring-enhancing lesions in the right occipital temporal junction.

extent of destructive spondylitis however spinal stabilization was not indicated. The brain lesions also did not require acute surgical intervention and rifampin, isoniazid, pyrazinamide, and ethambutol (RIPE) therapy was immediately initiated with the patient expecting a follow-up with infectious disease after 4 weeks.

### 3. Discussion

Tuberculosis in the western hemisphere remains an issue despite the ability to provide treatment and a cure. This case study provides a demonstration of the continued existence and severity of TB within a system that promotes infection and spread; the United States Correctional Facilities.

Tuberculosis Spondylitis, or spinal TB, accounts for the most common type of

central nervous system TB spread at around 10% - 35%, however overall osteoarticular spread accounts for only 1% - 3% of cases [4]. Radiography (MRI and CT) demonstrate findings similar to degenerative joint disease, pyogenic spinal infection, collapse due to osteopenia, and malignancy amongst other differentials. In our patient, mild back pain with new onset neurological deficiencies led to spinal imaging however the decision for AFB evaluation of cerebral spinal fluid aspirate was crucial in diagnosing PD. A year prior to hospitalization the patient had a negative purified protein derivative (PPD) test albeit non-confirmatory for latent TB. A recent study on prisoners testing negative for tuberculosis prior to incarceration revealed that out of 129 prisoners the two-year incidence of positive TB testing was approximately 29.5% [5]. In the United States, this continues to be part of a growing trend of TB infections amongst inmates without prior exposure.

Regarding the intracranial lesions, TB meningitis (TBM) is extremely rare. A recent longitudinal study regarding the emergence of more complicated TB in the United States discovered that despite the decline of TB infections, complications from TB meningitis were increasing. Measured complications demonstrated a rate of hydrocephalus increasing from 2.3% to 5.4%, seizures 2.9% to 14.1%, and strokes from 2.9% to 13.0% [6]. Overtime, this trend suggests TBM patients within the prison system face worsening problems. In this instance, the treatment options for disseminated TB to the spine/brain are different and often when complications arise such as hydrocephalus, then surgery is indicated. RIPE therapy is the mainstay for spinal TB and TBM however ethambutol has poor blood brain barrier penetration and patients are typically switched to a differing antimicrobial with better CNS penetration, such as quinolones or linezolid.

#### 4. Conclusion

Furthermore, progression of complications may be difficult to address for a patient within the prison system especially as one-half of TBM leads to severe disability or death [7]. Incarceration alone increases an individual's exposure and infection rate of TB when compared to the free world. Therefore, it is worth considering and investigating better solutions to the continued burden of TB and the emergence of rare complications for individuals within the United States Correctional Facilities.

#### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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