Urine brilliance: urine TB LAM's role in challenging AIDS cases from LMIC's perspective

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BACKGROUND

The identification of reliable markers for active tuberculosis (TB) diagnosis is pivotal, especially in challenging scenarios, particularly in low- and middle-income countries (LMICs), where co-infections, notably among individuals with AIDS, pose significant diagnostic challenges. Lipoarabinomannan (LAM), an immunogenic virulence factor released from metabolically active or degrading mycobacteria, presents a promising avenue for overcoming these hurdles. In this study, we present a case series that underscores the intricacies of TB diagnosis, specifically focusing on individuals co-infected with AIDS in LMICs.

OBJECTIVES

Our primary objective is to elucidate the diagnostic potential of urine LAM, strategically addressing challenges posed by atypical presentations and co-existing infections, particularly in the context of AIDS within LMICs. Several cases demonstrate the probability of TB, indicated through clinical presentation, where urine TB lipoarabinomannan (LAM) testing yielded positive results.

Case 1

A 62-year-old Chinese female with retroviral disease was noted to have tree-in-bud densities in both lungs, particularly affecting the upper lobe and superior segment of the right lower lobe, as well as consolidative changes in the right lower lobe in May 2020. However, her bronchoalveolar lavage (BAL) results from May 2020 indicated all tuberculosis (TB) investigations were negative. She showed evolving TB changes in March 2023 in the lung and was subsequently noted to have urogenital TB changes on CT scans. All investigations pointed towards a positive disseminated TB diagnosis:

- BAL on 14th March 2023: TB GeneXpert PCR positive, AFB negative, TB culture positive.
- Urine for AFB on 10th March 23: 1+ seen.
- Urine for TB PCR 10th March 2023: Mycobacterium tuberculosis (MTB) detected.
- Urine TB LAM 15th March 2023: Positive.

We believe that retrospectively, urine TB LAM testing would have added value in 2020 if conducted earlier and available.

Case 2

A 42-year-old male with newly diagnosed AIDS presented with constitutional symptoms and left upper limb weakness. Thorough investigations, including CSF examination, bronchoalveolar lavage, and imaging, did not suggest tuberculosis (TB). He was investigated for toxoplasmosis/CNS lymphoma with various tests and empirical treatments, but his condition continued to deteriorate. A repeated CT workup for pyrexia of unknown origin (PUO) conducted two months later revealed findings suggestive of disseminated tuberculosis involving the lungs, supraclavicular, mediastinal, and mesenteric caseating lymph nodes. The subsequent discovery of progressive TB occurred towards the end of the patient's life, coinciding with the availability of TB LAM testing at our center, which tested positive. He passed away due to advanced TB and a perforated esophageal ulcer. We believe that earlier diagnostic use of urine TB LAM could have made a difference in the overall management of this patient by providing corroborative evidence which was not available earlier.

Case 3

A 32-year-old male, previously diagnosed with retroviral disease in 2016 but did not seek treatment previousy, presented with severe headache and was subsequently diagnosed with cryptococcal meningitis. A CT scan of the thorax and abdomen conducted on July 2023 revealed various concerning findings, including a 3mm lung nodule in the anterior segment of the right upper lobe, multiple small ill-defined hypodensities in the spleen suggestive of microabscesses, and enlarged lymph nodes in various regions such as the abdomen, mediastinum, cervical, and parotid regions. Notably, a surveillance urine TB LAM test returned positive, while other TB investigations, including PCR and ultra TB GeneXpert, yielded negative results. Despite the absence of definitive TB diagnosis from conventional tests, all lesions responded well to anti-TB treatment, and the patient experienced a successful recovery. This case underscores the importance of urine TB LAM testing, particularly in resource-limited settings where a significant proportion of TB cases among people with HIV remain undiagnosed and untreated.

Case 4

A 62-year-old female presented with fever and constitutional symptoms, leading to a diagnosis of retroviral disease. Upon presentation, she was noted to have pancytopenia, and her blood culture returned positive for talaromyces. Additionally, her urine TB LAM test on presentation came back positive. CT scans revealed evidence of a left upper lobe lung lesion, multiple lymphadenopathies over the right paratracheal, mediastinal, and axillary regions, along with liver microabscesses. Despite other TB investigations returning negative results, she was initiated on anti-TB treatment. The urinary LAM testing, known for its high specificity and sensitivity, detected TB in more cases initiated on treatment than reference tests, demonstrating its efficacy in improving disease detection by 38.5% in intrathoracic TB patients and by 41.6% in lymph node TB patients. This highlights the crucial role of urinary LAM testing in diagnosing TB, especially when conventional tests may yield negative results.

DISCUSSION

Recognizing the imperative to avoid missing TB diagnoses in this vulnerable population, particularly in LMICs, we underscore the significance of urine TB LAM testing. Positive outcomes from LAM testing emphasize its potential for detecting TB amidst the backdrop of concurrent opportunistic infections in AIDS individuals within LMICs. The exploration of innovative methods, such as urine LAM testing, emerges as a crucial strategy to mitigate the risk of overlooking TB in this complex clinical context, ultimately enhancing health outcomes for individuals living with HIV in resource-limited settings.