INSTRUCTIVE CASE

Call for ultrasound in paediatric tuberculosis work-up: A case report from Germany

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Diagnosing childhood tuberculosis (TB) remains challenging. Microbiologic tests have low sensitivity due to the paucibacillary nature of paediatric disease and the difficulty in obtaining adequate samples; confirmation of TB disease is therefore often not achieved in children.1 Chest radiography (CXR) is the standard imaging modality but is limited by poor specificity and reader inconsistency in children.2 Extra-thoracic extra-pulmonary TB (EPTB) is not primarily investigated for in children despite a higher risk thereof.

Focused ultrasound to detect human immunodeficiency virus (HIV)-associated EPTB is routinely applied in adults in settings with high HIV/TB prevalence to support the diagnosis of TB where confirmation is restrained by limited diagnostic infrastructure or impeding host conditions such as HIV-infection.3

Data from South African children with presumptive pulmonary tuberculosis (PTB) showed that a positive TB focused ultrasound correlated with PTB.4 Abdominal lymphadenopathy and focal splenic lesions (micro-abscesses) correlated with HIV/TB coinfection but were also prevalent in HIV-negative children with PTB.4 Previous ultrasound studies in South African children with PTB had also reported that related abdominal lymphadenopathy and focal splenic lesions were frequent and a recent multi-centre study from Asian and African countries suggested a diagnostic algorithm including ultrasonography for abdominal lymph nodes to guide antituberculosis treatment decision in HIV-infected children with suspected TB.5 To date the potential diagnostic yield of systematically investigating children with presumptive TB for (concurrent) EPTB in addition to PTB has, however, not been studied in settings with low HIV/TB prevalence and ultrasound is commonly not systematically performed during TB work-up.

Here we report on a paediatric case from Germany where TB focused abdominal ultrasound during the diagnostic TB work-up was the determining diagnostic tool to establish a timely diagnosis of active TB. The boy’s parents consented to publication of his case.

Case Report

A 20-month-old boy was referred to the Department of Paediatrics at a tertiary care centre in Germany, to rule out active TB due to a tuberculin skin test (TST) conversion despite 3 months of anti-tuberculous prophylaxis.

The boy’s family had immigrated from Somalia to Germany some years before. The child’s HIV-negative mother had been diagnosed with drug-sensitive PTB 4 months before. At contact screening 4 weeks after the mother’s diagnosis, the boy was asymptomatic and a TST was negative. The child was started on a two-drug TB prophylaxis. Follow-up TST after 3 months of prophylaxis showed an ulcerating induration exceeding 10 mm and diagnostic TB workup was initiated.

TB-related symptoms were absent and clinical examination revealed no pathology. The patient was on the 21st weight-related percentile. Routine laboratory analyses were normal. The parents reported good compliance with TB prophylaxis.

First-line diagnostic TB work-up consisted of interferon-gamma-release assay (positive), anterior–posterior CXR (no TB-specific findings) and three morning gastric aspirates examined by microscopy (Ziehl-Neelsen stain), polymerase chain reaction (PCR) and liquid culture. No acid-fast bacilli were detected by microscopy, but two out of three PCR tests detected faint traces of nucleic acid of Mycobacterium tuberculosis complex. The PCR results were communicated as possibly false-positive by the microbiology department.

Given the inconclusive results of first-line tests, a TB focused abdominal bedside ultrasound was performed by the clinician in charge of the patient to assess for abdominal lymphadenopathy and focal splenic lesions suggestive of active EPTB. The clinician performing the bedside ultrasound initiated this point-of-care examination because of his personal preceding positive experience with TB focused ultrasound in presumptive TB patients in India.6 Ultrasound revealed multiple hypoechoic splenic lesions sized 5–15 mm characteristic of TB micro-abscesses (Fig. 1a).

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Since the child was asymptomatic and CXR was not suggestive of TB, he was initially treated as a case of non-communicable gastro-enteritis. Several weeks later, liquid culture grew drug-sensitive M. tuberculosis. During follow-up ultrasound was an effective monitoring tool. Sonographic features compatible with TB are not confirmed and need to be interpreted within the clinical and epidemiological context. Differential diagnoses for abdominal lymphadenopathy and splenic micro-abscesses in children are broad and include many different infectious diseases (e.g. brucellosis, bartonellosis) as well as non-communicable diseases (e.g. lymphoma). As pointed out above, evidence on the utility of focused ultrasound for EPTB is reported from settings with moderate and high TB/HIV-prevalence. Recently the utility of lung ultrasound for PTB has also been reported and discussed for children and adults; however, more data are needed to better understand the diagnostic potential of lung ultrasound in discriminating PTB from other respiratory infections. The utility of systematic ultrasound investigation in settings with low TB/HIV-prevalence has not been studied yet. Irrespective of TB endemicity children have a higher risk for extra-thoracic TB even in the absence of HIV-infection and may therefore benefit from abdominal ultrasound during TB work-up.

Depending on the setting, ultrasound may be performed either as a focused point-of-care examination by the treating clinician or as formal ultrasound examination by the radiology department. In settings with a low TB case load, formal ultrasound should be performed by radiologists or equally trained sonographers. In institutions with regular TB cases, however, for example institutions with specialised TB or infectious disease clinics, clinicians can quickly acquire sufficient expertise in TB focused ultrasound which will provide them with a point-of-care tool to improve timely TB diagnosis and follow-up.

In summary, available evidence and our case report suggest that the diagnostic utility of (TB focused) ultrasound as a standard diagnostic examination during paediatric and adult TB work-up should also be investigated in settings with an overall low TB burden.

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