European Journal of Internal Medicine 66 (2019) 27–28

Contents lists available at ScienceDirect

European Journal of Internal Medicine

journal homepage: www.elsevier.com/locate/ejim

Commentary

Role of ultrasound in the diagnosis of tuberculosis

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Tuberculosis (TB) is one of the most important infectious diseases affecting a sobering 10 million people worldwide per year and causing 1.6 million deaths annually [1]. The large majority of cases are seen in Sub-Saharan Africa and in other low-and-middle-income countries (LMIC) with strained health systems. The search for affordable diagnostic tools is therefore a pressing topic for these countries. Over the past years, increasing migration also brought TB patients to Europe, requiring European hospitals and physicians to diagnose a disease [2], which used to be considered either "historical" or "tropical."

Chest radiography (CXR) is considered the mainstay imaging modality for diagnosing pulmonary tuberculosis (PTB). However, in the global health era, we need to consider that CXR may not be available to many, and even when available, that many patients will be unable to afford a CXR exam [3]. Unfortunately, these patients are exactly the populations mostly affected by TB.

For the past 10 years, attempts to diagnose different forms of TB by ultrasound have been reported. Pericardial effusions, pleural effusions as well as enlarged abdominal lymph nodes, splenic micro-abscesses and ascites were described as sonographic findings highly suggestive of tuberculosis in HIV co-infected patients. The fact that these findings can be identified relatively easily and thus also clinicians with less ultrasound experience can recognize them [4] led to the development of the Focused assessment with sonography for HIV-associated TB (FASH) protocol [5]– a protocol widely used in African countries [6].

With the increasing use of lung ultrasound in a variety of lung conditions– the search for sonographic signs of PTB is timely. Only a few years ago many practitioners would have considered lung ultrasound irrelevant as lung contains air, which stops ultrasound waves. Today it is common knowledge that lungs can be scanned to obtain relevant information, mostly by considering artifacts. Artifact patterns were identified for alveolar and interstitial pneumonia, pneumothorax, pleural effusion and acute pulmonary edema [7]. In HIV patients, sonographic findings of a variety of lung conditions were described [8] including *Pneumocystis jirovecii* pneumonia [9] and miliary tuberculosis [10]. Sonographic findings of PTB were described in children [11] and adults [12], but wider clinical experience is still scarce.

In this issue Montuori and colleagues [13] describe their experience in a single center in Italy diagnosing PTB based on ultrasound findings compared to radiological and microbiological data. They compare TB patients with unselected patients with a wide range of differential diagnoses, resembling real life situations often faced by clinicians. The proportion of patients co-infected with HIV was lower substantially than in many African settings. The group reported findings of "apical consolidations" and "subpleural nodules" to be associated with PTB and in their model these findings show good sensitivity and specificity. The fact that pleural effusions were not associated with TB is remarkable as pleural effusions, especially when unilateral, are considered suggestive of TB [14].

These exciting findings will have to be replicated by other groups and estimates on the interobserver variation will be required. The diagnostic value preferably also need to be studied in resource-limited settings where TB is more prevalent and changes in patient's lung due to previous episodes of TB may have a bigger confounding effect. To have a diagnostic impact on a wider public health level, the ease and the reliability to identify the ultrasound findings even without significant imaging training and with simple, affordable equipment are paramount [15]. It is important that clinicians (or ultrasound technicians) in LMIC with less experience can use them to be relevant to the underserved populations.

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DOI of original article: https://doi.org/10.1016/j.ejim.2019.06.002
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https://doi.org/10.1016/j.ejim.2019.07.002
Received 25 June 2019; Accepted 7 July 2019
Available online 25 July 2019

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