THORACIC ULTRASOUND BY THE PULMONOLOGIST: A WAY FORWARD

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This editorial may be cited as: **Mahmud T. Thoracic ultrasound by the pulmonologist: A way forward. J Postgrad Med Inst 2017; 31(3): 219-20.**

Thoracic ultrasound, once thought to be of least consideration due to presence of air in the lungs has now become standard practice in the evaluation of various pleuro-pulmonary disorders. Pulmonary physician-led bed side chest ultrasound is authentic, safe, quick, cost effective and helps in clinical decision making, in patients with complicated pleural, pulmonary and chest wall processes.

A variety of pleural disorders including, but not limited to pleural transudates, pleural infections, malignant effusions and pneumothoraces are commonly encountered in busy pulmonary practice both in out-patients and hospitalized population[1]. These conditions usually require radiological investigations which may include plain chest radiographs, chest ultrasound and CT scans. Thoracic ultrasound (TUS) is typically performed using a 3.5 to 5.0 MHz transducer/probe with a convex sector in most instances. Once an abnormality has been identified, a 7.5 to 10 MHz linear transducer can be used if needed to obtain more detailed images[2].

The ultrasound waves (pulses of sound) are sent from the transducer, propagate through different tissues and then return to the transducer as reflected echoes. The returned echoes are converted back into electrical impulses and undergo further processing to form the image on the screen. TUS has many advantages over traditional radiographic imaging, including no radiation, real-time imaging, better portability and the ability to perform dynamic imaging. TUS not only helps in the diagnosis of these conditions, it also provides guidance for correct drains placement in patients with pleural fluid collections and also aids needle aspiration or biopsy of pleural or sub-pleural lung nodules/masses[3].

Besides being gold standard for pleural fluid localization, TUS has now a superior role for identification of pneumothoraces in a supine trauma patient or patients in intensive care unit, compared to conventional chest radiography[4]. TUS is an operator and patient dependent (patient should be able to change the position to permit scanning of the whole hemithorax) technology, endorsed by various guidelines but supervised training is needed to ensure that the operator correctly interprets the sonographic findings[5].

Until recently across good centers in the world, TUS was primarily performed by radiologists. There was a paradigm shift in Europe after a 2008 report by National Patient Safety Agency (NPSA) that showed an unacceptable level of harm during the blind insertion of intercostals chest drains for pleural fluid conditions and recommended bedside TUS to identify a safe area for thoracic drain placement[6]. This led to the widespread utilization of TUS by pulmonologists, and achieving level one Royal College of Radiology (RCR) ultrasound competence is now a training requirement in the curriculum for respiratory registrars in the United Kingdom[7]. Studies have also shown that utilization of TUS by pulmonologists has comparable level of safety (complication rates) and accuracy to that of radiologists[8]. There is now a wider scope for pulmonary physicians to perform guided procedures which were traditionally performed by radiologists, such as ultrasound-guided pleural aspirations, biopsies and drains placement.

One great advantage to ultrasound is that it is now often performed by the clinician responsible for the patient's care, which means the clinician has control over how quickly the test is performed and has the clinical knowledge to make further management decisions immediately[9]. Furthermore from a clinician's point of view, TUS (in comparison to a chest radiograph) can confidently differentiate between pleural fluid, dense consolidation and a raised hemidiaphragm. TUS is increasingly

recognized as an imaging modality with high sensitivity for identification of malignant pleural involvement, pleural thickening and septations/loculations within pleural effusions. Therefore before considering the first pleural procedure in a treatment naïve patient, TUS can provide valuable information about pleural space abnormalities that helps in selection of appropriate management options for that particular patient. Many patients with diseases involving lung parenchyma e.g. pneumonia, pulmonary edema, lung abscesses and mass lesions may require further evaluation after routine chest radiography. Ultrasound has extended role in identification, differentiating and decision making for these processes and therefore provides great assistance to the pulmonary physician responsible for patient's care[8,9].

In Pakistan, TUS is gaining momentum as a diagnostic tool for the assessment of pleural diseases across different academic centers including the author's one[10]. Despite enthusiasm at selected centers in the homeland, there remain significant barriers to increasing national adaptation of this useful bed side modality. The contributing factors may include lack of awareness, slight hesitation to learn at senior physician's level, relatively poor access to training and possibly a lack of available funding to purchase quality ultrasound machines. There has also been a significant lack of interest shown by industry partners who predominantly target the radiologists and are possibly least aware of physician-led TUS practices. There should be hands-on TUS training courses during national pulmonology conferences and seminars where industry partners in collaboration with clinicians can provide demonstration for instruments' use. Local postgraduate training programs should include TUS as part of pulmonary curriculum to enhance its learning among pulmonology trainees, specialists and consultants. As diagnostic algorithms are created and physicians' ultrasound training becomes more advanced, we may be able to determine the correct management for patients before the first pleural aspiration procedure is performed.

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