EDITORIAL

Thoracic Ultrasound – A Silent Métiere Time to Change Clinical Practice

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After many long years of silent observations by physicians, thoracic ultrasound has made its way into day to day pulmonology and critical care practice all around the globe — and in fact, in all specialties where the doctor hangs a stethoscope around his neck. Ultrasound technology has enabled the pulmonologist to safely perform a wide range of thoracic procedures. It helps in early diagnosis and management of respiratory patients. It ensures that appropriate patient gets the appropriate intervention, thus streamlining the care pathway and ensuring safety.

The accessibility of portable ultrasound machines has significantly improved the management, with benefits including the absence of radiation, ease of use, and real time imaging. It can be performed at the bedside and no particular preparation is required.

The most commonly performed procedures in a respiratory ward include pleural aspiration, closed pleural biopsy, tube thoracostomy, tumour biopsies and medical thoracoscopy. The literature shows a high complication rate when these procedures are done without image guidance.

The most common complications include pneumothorax, haemorrhage, procedure failure dry tap in case of pleural aspiration, and the gravest, visceral injury. A number of causes are reported to increase the complication rate. The most widely agreed contributing factor is performing procedures without image guidance. In a large cohort study[1], post procedure pneumothorax was reported in 18% of blind pleural aspirations versus 3% in procedures performed under ultrasound guidance. Many of these mishaps were due to inappropriate site selection as shown in a cohort where 15% of sites identified without image guidance were inaccurate and would have resulted in injury to solid viscus like lung, liver, or spleen[2]. Ultrasound prevented 10% of potential organ punctures.

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Another meta-analysis[3] conducted on articles published between 1996 and 2009 showed that pneumothorax occurred in 7–15% of patients who underwent blind thoracentesis. This frequency drops to 0.5% when the procedure is performed under ultrasound guidance.

In a small study, it was shown that the causes of failed pleural procedures were wrong site selection in 38%, no pleural fluid present in 31%, loculated effusion in 11%, and consolidation or tumour in 11%.[2] All these could have been known earlier if ultrasound was performed before the procedure.

So, in everyday practice, chest ultrasound can—rather should—be utilized as a guide in interventional procedures.

Some pulmonologists are of the view that image guidance is not needed for aspirating large pleural effusions not occupying the entirety of the hemithorax. However, in this scenario of day to day clinical practice, ultrasound helps by making it possible to visualize the characteristics of the effusion, whether it is multi-septated or free—wherein for both these varieties, one would have a different interventional approach. Here, ultrasound is considered the gold standard in revealing the septations, even far better than computed tomography scanning. It will also uncover underlying abnormalities not apparent on chest x-ray like a raised diaphragm or adherent lung.

It is also recommended to use ultrasound for the correct placement of a chest tube in pleural effusion. In complicated effusions—notoriously 'difficult-to-manage' and multi-loculated, not visible at times between the folds of parenchyma adhering to the chest wall—an ultrasonic approach is absolutely mandatory. With the use of Doppler, it is feasible to approach the course of the intercostals vessels, avoiding their perforation or, more awful still, their laceration during tube insertion.

However, in the case of chest tube insertion in a pneumothorax, it is of less value since it is not easy to obtain good images, as air transmits sound waves poorly.

In the realm of medical thoracoscopy, ultrasound aids in knowing the involvement of the diaphragm, presence of masses or adherences to be avoided during trocar insertion, disease of lung parenchyma, and effusion characteristics.

Thoracic ultrasound must also be used in critical care settings where obtaining good chest x-ray images are nearly impossible. Furthermore, interpretation of supine films to diagnose pleural effusion in ICU is challenging. Of extreme significance here is the fact that thoracic ultrasound can be performed in both affluent and resource constraint settings. In today's era, thanks to the field of biotechnology, small, portable, handheld and user friendly machines are available.

Lastly, thoracic ultrasound is highly operator dependent and appropriate training in the field is necessary before performing it independently. The Joint Royal College of Physicians Training Board has included pleural ultrasound training as a mandatory module in specialty training curriculum for respiratory medicine[4]. All those providing ultrasound services in the UK are legally vulnerable if they are not adequately trained and are improbable to be able to mount a defense against a claim for negligence.[5]

It is a necessity of the present era to include thoracic ultrasound education in the curriculum of postgraduate respiratory medicine training in Pakistan and it should be made mandatory before any pleural or lung interventions.

The use of ultrasound will enhance the understanding of pleural diseases and is associated with clinical benefits that will lead to improved patient care.

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