00333 NOVEL USE OF PLEURAL ULTRASOUND CAN IDENTIFY MALIGNANT TRAPPED LUNG PRIOR TO EFFUSION DRAINAGE

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Rationale The presence of trapped lung changes the appropriate management of malignant pleural effusion from pleurodesis to insertion of an indwelling pleural catheter (IPC). Trapped lung resists expansion following drainage of an effusion and so is associated with an elevated pleural elastance (PEL). However, no methods currently exist to identify trapped lung prior to effusion drainage, and so definitive management of malignant pleural effusion requires at least 2 procedures. Ultrasound (US) can quantify both tissue movement and tissue deformation (strain). This study documents a novel method to identify trapped lung prior to effusion drainage, using tissue movement and strain analysis with thoracic US and compares it with PEL.

Methods Prior to drainage, 81 patients with suspected malignant pleural effusion underwent thoracic ultrasound using an echocardiogram machine. Images of the atelectatic lower lobe were acquired during breath-hold, allowing motion and strain related to the cardiac impulse to be analysed using motion-mode (M Mode) and speckle-tracking imaging (STI) respectively. PEL was measured during effusion drainage. The gold standard diagnosis of trapped lung was the consensus opinion of two interventional pulmonologists according to post-drainage imaging. Participants were randomly divided into development and validation sets.

Results Both total movement and strain were significantly reduced in trapped lung (Figure 1). The area under the receiver-operating curves calculated using data from the development set were 0.86 (STI), 0.79 (M Mode) and 0.69 (PEL). Cut-offs chosen to maximise sensitivity and specificity for STI, M Mode and PEL were 6%, 1mm and 19cmH20 respectively. Applying these cut-offs to the validation set, the sensitivity/specificity was 71%/85% for STI, 50%/85% for M Mode and 40%/100% for PEL.

Conclusions This study has introduced a novel US technique which can identify trapped lung prior to effusion drainage. This could allow appropriate choice of definitive management early (pleurodesis vs IPC), reducing the number of interventions required to treat malignant pleural effusion. It may be that with further study, its use could be applied to other areas of pleural disease, such as investigation of non-malignant lung entrapment or as a guide to when surgical intervention is required for loculated pleural infections.