PROCEDURE CHECKLIST

Ultrasound: lung and pleura

Bedside ultrasound of the lungs and pleural spaces to look for pneumothorax, pleural effusion, consolidation and interstitial (B-line) disease in the breathless, hypotensive or injured patient.

EM Orbit

Patient reference | Date | Time | Completed by

Equipment ready

- [ ] Ultrasound machine with a lung or small-parts preset
- [ ] High-frequency linear probe for the pleural line and lung sliding
- [ ] Curvilinear or phased-array probe for B-lines, effusions, consolidation and deeper structures
- [ ] Ultrasound gel; sterile cover and gel if a procedure follows
- [ ] Image storage and clip recording facility
- [ ] Probe cleaning wipes per manufacturer and local policy

Before · Preparation

- [ ] State the clinical question: pneumothorax? fluid? consolidation? pulmonary oedema?
- [ ] Resuscitate and treat the patient as normal; the scan does not replace clinical judgement.
- [ ] Position the patient: supine for the anterior chest, because air rises to the front; sit upright or turn to the side for the lateral and posterior zones if possible.
- [ ] Select the probe: the linear probe for the pleural line, and the curvilinear probe for fluid, consolidation and B-lines.
- [ ] Orientate the probe with the marker to the patient's head (longitudinal, with the ribs and shadows), and check the screen marker.
- [ ] In ventilated patients, note the ventilator mode and whether the patient is making breathing efforts.

During · Finding the pleural line

- [ ] Place the probe longitudinally on an intercostal space, between two ribs, with the marker to the head.
- [ ] Identify the two ribs with their acoustic shadows and the bright, horizontal pleural line, which lies slightly deeper than the ribs (the 'bat sign').
- [ ] Look for lung sliding: a shimmering to-and-fro movement of the pleural line with breathing. Use M-mode: a 'seashore' pattern (grainy below the line) indicates sliding; a 'barcode' or 'stratosphere' pattern (horizontal lines throughout) indicates no sliding.

During · Artefacts

- [ ] A-lines are horizontal, repeating, equally spaced reflections of the pleural line below it. They are normal in healthy lung and are also seen in pneumothorax, asthma and chronic obstructive pulmonary disease.
- [ ] B-lines are discrete, laser-like vertical lines arising from the pleural line, extending to the bottom of the screen and moving with lung sliding. They erase the A-lines.
- [ ] Look for the lung pulse: tiny movements of the pleural line synchronous with the heartbeat in a lung without sliding. A lung pulse shows that the lung touches the chest wall at that point and excludes pneumothorax there.
- [ ] Look for the lung point: the place where lung sliding disappears as the lung separates from the chest wall. A lung point confirms pneumothorax.

During · Structured sequence — scan each side

- [ ] Anterior upper zone: second or third intercostal space, mid-clavicular line. Identify the pleural line, sliding and A-lines or B-lines.
- [ ] Anterior lower zone: fourth or fifth intercostal space in the mid-clavicular line, above the diaphragm. Identify the pleural line, sliding and A-lines or B-lines.
- [ ] Lateral zone: mid-axillary line, level with the nipple or slightly lower. Identify the pleural line, sliding and A-lines or B-lines.
- [ ] Posterolateral zone: posterior axillary line, at the level above the diaphragm; the patient lying supine or turned slightly. Look for fluid above the diaphragm and for consolidation, with the spine sign.
- [ ] Repeat all zones on the other side, and compare the two sides.

During · Pneumothorax

- [ ] Absent lung sliding with a barcode pattern, A-lines and no B-lines or lung pulse suggests pneumothorax; search for the lung point to confirm it.
- [ ] Presence of lung sliding, B-lines or a lung pulse at a point excludes pneumothorax at that point only.
- [ ] Scan the most non-dependent areas first (the anterior chest in a supine patient), then the lateral zone, and then move along each side to find the edge of the pneumothorax.
- [ ] **Do not diagnose pneumothorax from absent lung sliding alone.**
  Absent sliding also occurs in right main-stem intubation, bullae, pleurodesis, pleural adhesions, severe fibrosis and apnoea.
- [ ] **Do not delay needle or finger decompression and chest drainage in a tension pneumothorax to obtain an ultrasound image.**

During · Effusion, haemothorax and consolidation

- [ ] Place the probe in the posterolateral zone above the diaphragm with the patient sitting up if possible, or lying with the side raised.
- [ ] Pleural effusion appears as an anechoic or hypoechoic space between the parietal and visceral pleura above the diaphragm, with the spine sign (the vertebrae visible above the diaphragm) and a lung that moves in the fluid (the 'curtain' sign or floating lung).
- [ ] Haemothorax appears as complex echogenic fluid, sometimes with swirling echoes or clot; ultrasound cannot tell blood from other fluid without the clinical context.
- [ ] Consolidation appears as lung with a tissue-like texture, like the liver (hepatisation), with air bronchograms, which move with breathing in pneumonia.
- [ ] If drainage is needed, use real-time ultrasound guidance, or mark the site with the patient in the position in which the procedure will be done.

After · Interpretation and action

- [ ] Summarise the findings by zone and side: sliding present or absent, A-lines or B-lines, fluid, consolidation, lung point or lung pulse.
- [ ] Pattern A (A-lines with sliding) in a breathless patient suggests asthma, chronic obstructive pulmonary disease, pulmonary embolism or other non-pulmonary causes.
- [ ] Bilateral B-lines in several zones suggest pulmonary oedema (cardiogenic or not); asymmetric B-lines suggest pneumonia.
- [ ] A large effusion or haemothorax: arrange drainage, in line with the clinical picture and local protocol.
- [ ] A negative scan at one point does not exclude a pneumothorax elsewhere: reassess if the patient's condition changes, and arrange a chest X-ray or CT when needed.

After · Documentation and cleaning

- [ ] Save representative clips of each abnormal zone and M-mode images.
- [ ] Document the indication, zones scanned, findings, limitations and actions.
- [ ] Clean the probe according to the manufacturer and local policy; use a barrier cover for scans over open wounds or procedures.



A procedure checklist. Perform procedures only within your training, competence and local policy. It does not replace your clinical judgement.
EM Orbit · Emergency medicine, in one orbit · proc-pocus-lung · red rows are the steps that must not be missed