

Lung Ultrasound in Patients with Suspected/Confirmed COVID-19:

Quick Reference Guide

- * Chest X-ray following admission for ETT, NGT, CVC position is recommended
 - Also allows for baseline assessment of lung pathology
 - Can be repeated but images may not correlate with the clinical picture
 - Logistical challenges with performing CXR in isolated patient
- * CT Chest **NOT** indicated due to high difficulty in transportation and high risk of cross infection
- * Lung Ultrasound is highly effective for daily evaluation of the lung status
 - **PATTERN 1 (interstitial syndrome):** Diffuse B-line profile = Consider **PEEP strategy and fluid balance**
 - **Type L:** Low recruitability, higher vT (8-9ml/kg), PEEP 8-10cmH2O
 - **PATTERN 2 (Alveolar syndrome):** Basal PLAPS points showing consolidation / parapneumonic effusions / atelectasis where front areas ventilated, rear areas atelectatic = responsive to **prone ventilation**
 - **Type H:** Treat as severe ARDS, **higher PEEP, prone ventilation, ECMO referral**
 - Useful in evaluating the effect of high PEEP and managing recruitment manoeuvres

Technique

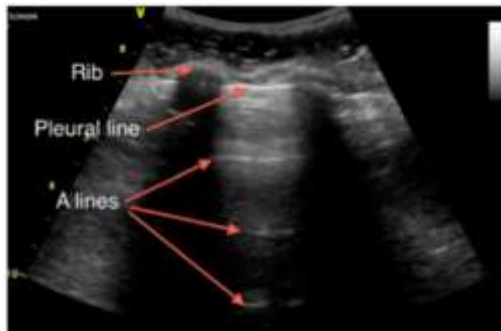


Fig 3 Probe positioning (reproduced from Whole Body Ultrasonography in the Critically Ill by D. Lichtenstein with kind permission from Springer.)

- * Probe should be placed at 90° to the skin (longitudinal and not transverse)
- * Left of the screen cephalad and the right caudad
- * **Upper anterior point**, Linear probe (8–12 MHz), Point lies over upper lobe
- * **Lower anterior point**, Linear probe (8–12 MHz), Point lies over the middle or lingular lobe

- * **Postero-lateral point**, Curvilinear probe (3–5 MHz) or phased array (5-1 MHz), Point over lower lobe
- * Can be performed in prone position (NB: more lower lobe in view, need to avoid scapulae)

Upper/Lower anterior point (TO EXCLUDE PNEUMOTHORAX)



- * **Normal appearance:**
 - * **'Bats wing'**- Ribs (wings) with pleural line in between
 - * **A-lines-** Reflected pleural line
 - * **Lung sliding** 'Line of marching ants'
 - **Excludes pneumothorax**

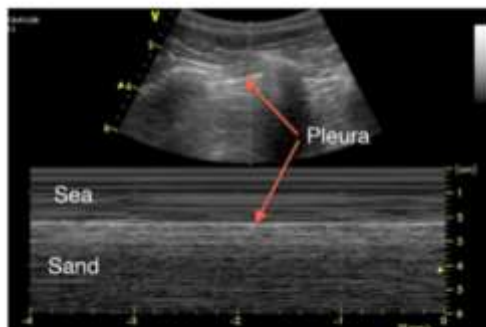


Fig 3 M-mode image of lung sliding (the 'seashore sign').

- * Loss of lung sliding
 - * **Stratosphere (barcode) sign**
 - * **Abnormal sign** seen in pneumothorax/ARDS/severe consolidation/low vT/fibrosis
 - Does not **CONFIRM** pneumothorax

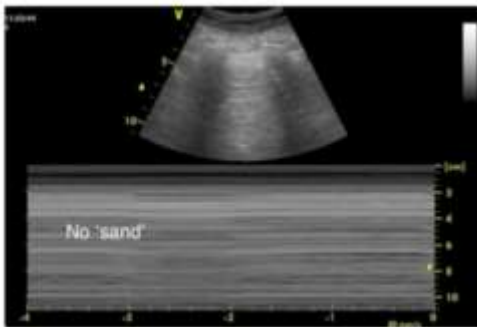


Fig 4 M-mode image of absent sliding (the 'stratosphere sign').

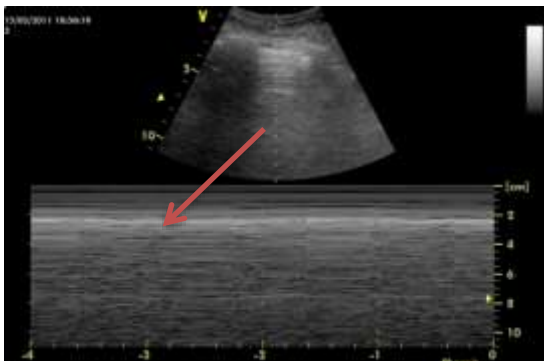
Lung point

- * Point at which parietal and visceral pleura re-connect
 - * Pneumothorax
 - * Pleural effusion

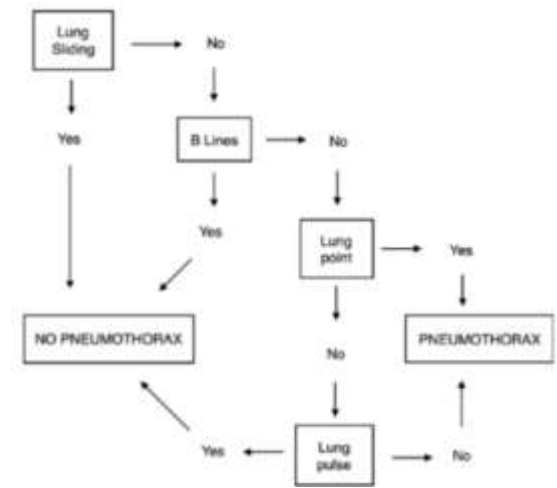


Lung pulse ('T-lines')

- * Vibrations caused over time by cardiac output passing through motionless lung (no lung sliding)
- * Seen in 'stiff' lungs due to inflammatory adhesions (pleural symphysis) e.g. ARDS
- * Exclude pneumothorax as USS transmission through lung is required



Pneumothorax algorithm



Interstitial syndrome (PATTERN 1/Type L)- Consider PEEP strategy +/- diuresis

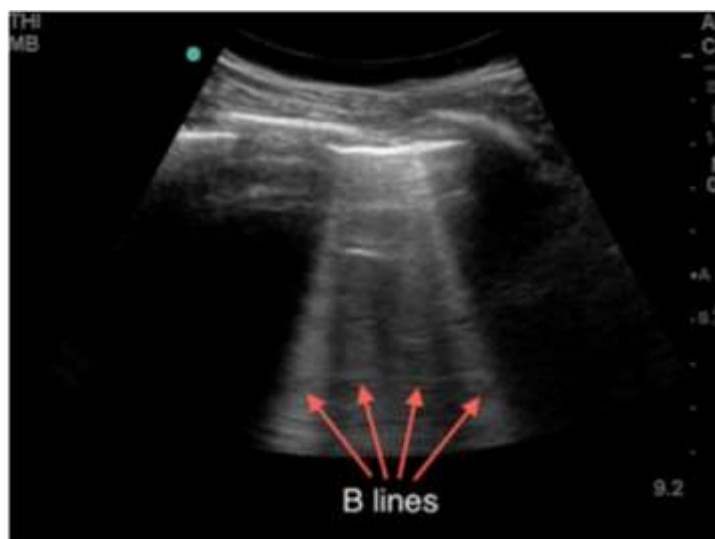


Fig 5 B lines demonstrating IS.

- * **B-lines**
 - * Comet tails = Kerley B lines
 - * Extend from pleura to depth of image
- * 3 or more pathological
- * Closer together = more oedema

- * Low recruitability, higher vT (8-9ml/kg), PEEP 8-10cmH2O

Postero-lateral point (PATTERN 2/Type H)-Consider higher PEEP and prone ventilation

Alveolar syndrome

- * **Tissue-like sign** (hepatized lung)- Atelectesis
 - Consider recruitment manoeuvres and PEEP
 - +/- draining large effusions causing hydrostatic/extrinsic pressure on lung

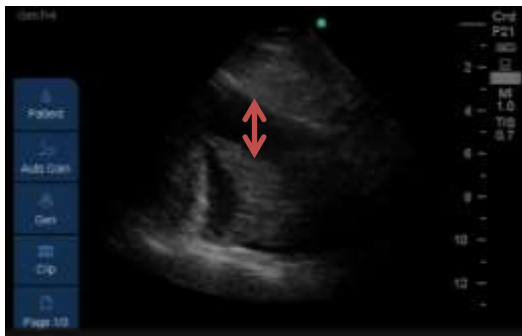


- * **Shred sign**- Consolidation/collapse
- * Type H: Treat as severe ARDS, higher PEEP, prone ventilation, ECMO referral
 - Consider prone ventilation
 - Bronchoscopy **NOT** advised due to aerosolising procedure



Pleural effusion

- * **Quad sign**- Transudate vs exudate (septations/echoic)



- * ?Size- Effusion depth of >4–5 cm at the widest point = >1000 ml

References

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