πνευμονία

ΔΡ. ΗΡΑΚΛΗΣ ΤΙΤΟΠΟΥΛΟΣ ΕΠΕΜΒΑΤΙΚΟΣ ΠΝΕΥΜΟΝΟΛΟΓΟΣ ΔΙΕΥΘΥΝΤΗΣ ΠΝΕΥΜΟΝΟΛΟΓΙΚΗ ΚΛΙΝΙΚΗ ΙΑΤΡΙΚΟ ΔΙΑΒΑΛΚΑΝΙΚΟ ΘΕΣ/ΝΙΚΗ

πνευμονία

- Pneumonia is an inflammatory, most commonly infectious process involving the lungs
- Typically the alveoli in intensely inflamed areas fill with inflammatory fluid or pus, and this is known as **consolidation**
- The changes may be widespread, patchy or lobar.

- Typically, the diagnosis of pneumonia is performed based of the patients' clinical exam, history, labs and x-ray. However, these tests have been shown to be unreliable and inaccurate
- A JAMA meta-analysis concluded that no individual or combined clinical findings have been found to accurately predict whether or not a patient has pneumonia
- X-ray has been found to have a sensitivity ranging from 46-77% when a CT scan is used as the gold standard. Those same studies show US to have a sensitivity ranging from 93-100%

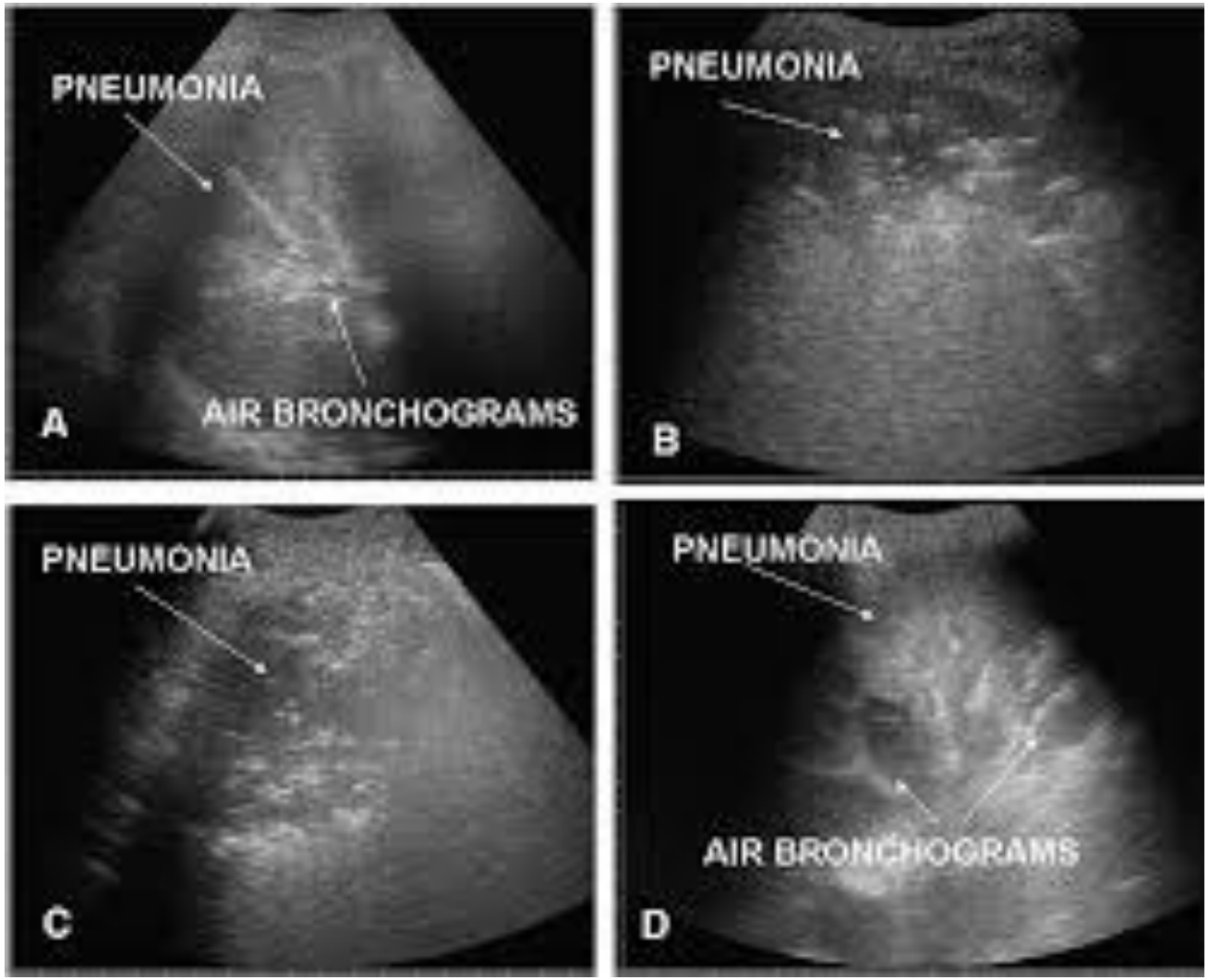
Η διαθωρακική υπερηχογραφία σε πνευμονία

- Ultrasound can detect the pulmonary changes associated with pneumonia as long as the process involves some of the outer (non-mediastinal) pleural surface – as it almost always does
- Pneumonia progresses though stages, and the ultrasound changes vary depending on the degree and extent of consolidation

- air bronchogram
- b-lines
- subpleural consolidations
- pleural line abnormalities
- pleural effusions
- empyema

Air bronchograms

Placing the probe on the right posterolateral lung field, you see something abnormal. Instead of seeing a linear pleural line between ribs and a-lines, you see a hypoechoic pulmonary consolidation that contains hyperechoic lines and flecks that move with respiration. These are known as **air bronchograms**



Air bronchograms

The most specific sign for the diagnosis of pneumonia is the presence of **air bronchograms**, which are hyperechoic lines and dots within a hypoechoic area, thought to represent air trapped in small airways within a consolidation

Air bronchograms are divided into two types: Dynamic and Static

If the bronchograms are mobile, they are considered **dynamic** air bronchograms and are thought to be ***pathognomonic*** for pneumonia.

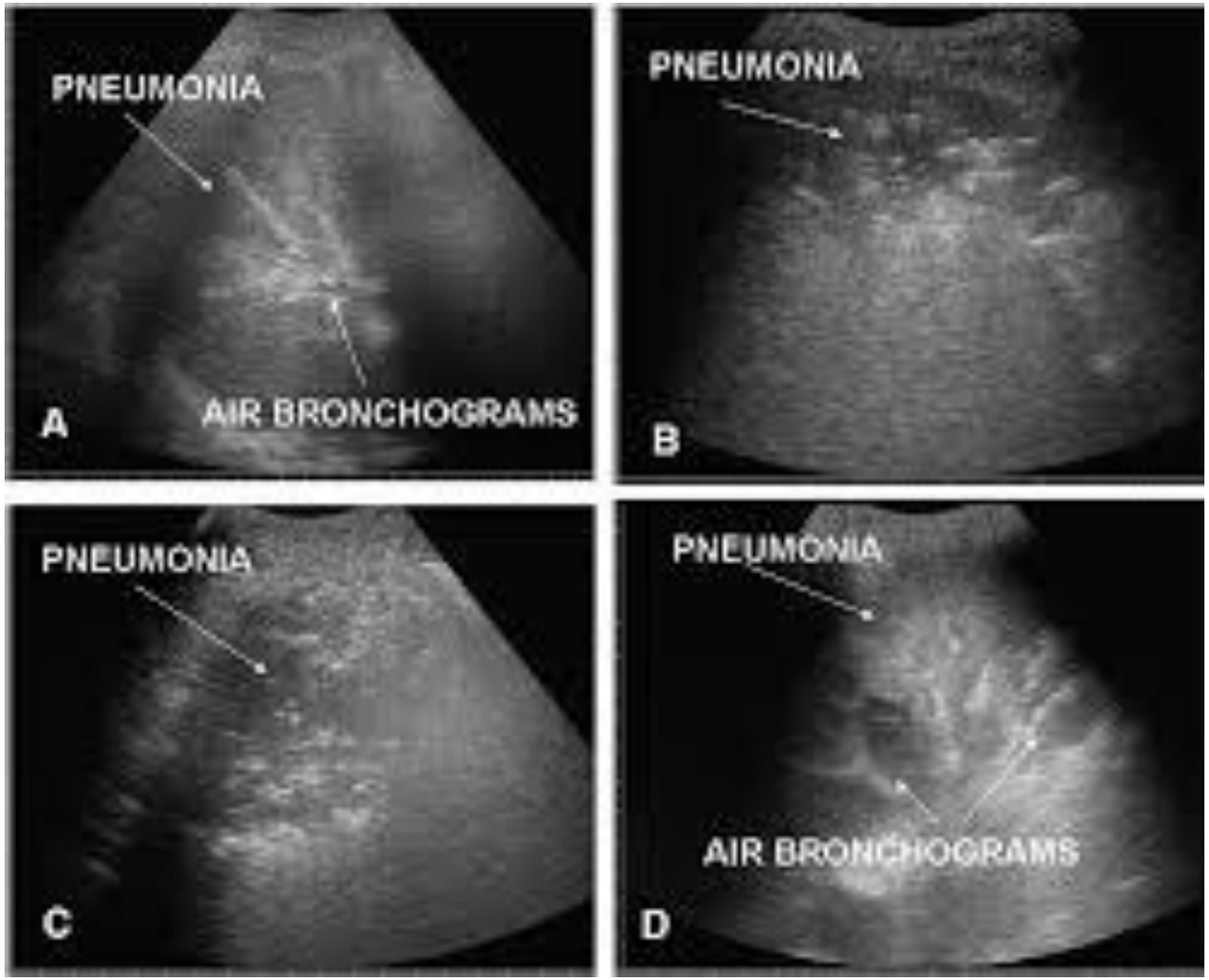
If the bronchograms are immobile they are then called **static** air bronchograms which can be seen in both atelectasis and pneumonia

Το σημείο του αεροβρογχογράμματος

Το σημείο του αεροβρογχογράμματος αποτελεί σημαντικό διαγνωστικό σημείο στη διαφορική διάγνωση μεταξύ πνευμονίας και ατελεκτασίας

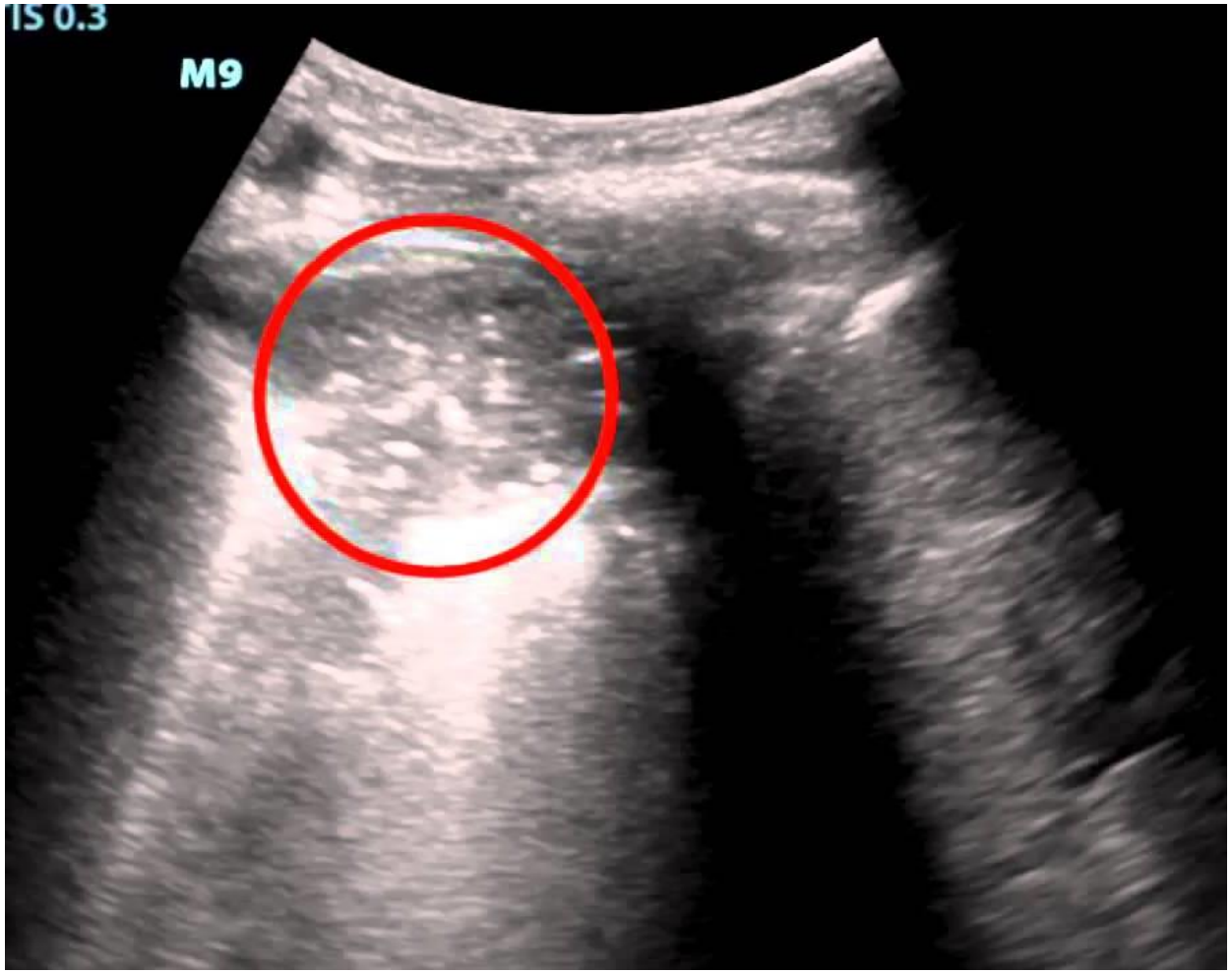
Το δυναμικό αεροβρογχόγραμμα χαρακτηρίζεται από παρουσία αέρα σε δυναμική κίνηση εντός του βρογχικού δικτύου και απαντάται στην κυψελιδική πύκνωση. Το σημείο αυτό παρουσιάζει 94% και 97% ειδικότητα και θετική προγνωστική αξία, καθώς και 61% και 43% ευαισθησία και αρνητική προγνωστική αξία στη διάγνωση της πνευμονίας έναντι της ατελεκτασίας.

Αντίθετα, το στατικό αεροβρογχόγραμμα αποτελεί σημείο ενδεικτικό ατελεκτασίας και απεικονίζεται με την ανάδειξη του στατικού εναπομείναντα εγκλωβισμένου αέρα εντός της ατελεκτατικής περιοχής του πνεύμονα.



Early pneumonia – B-lines

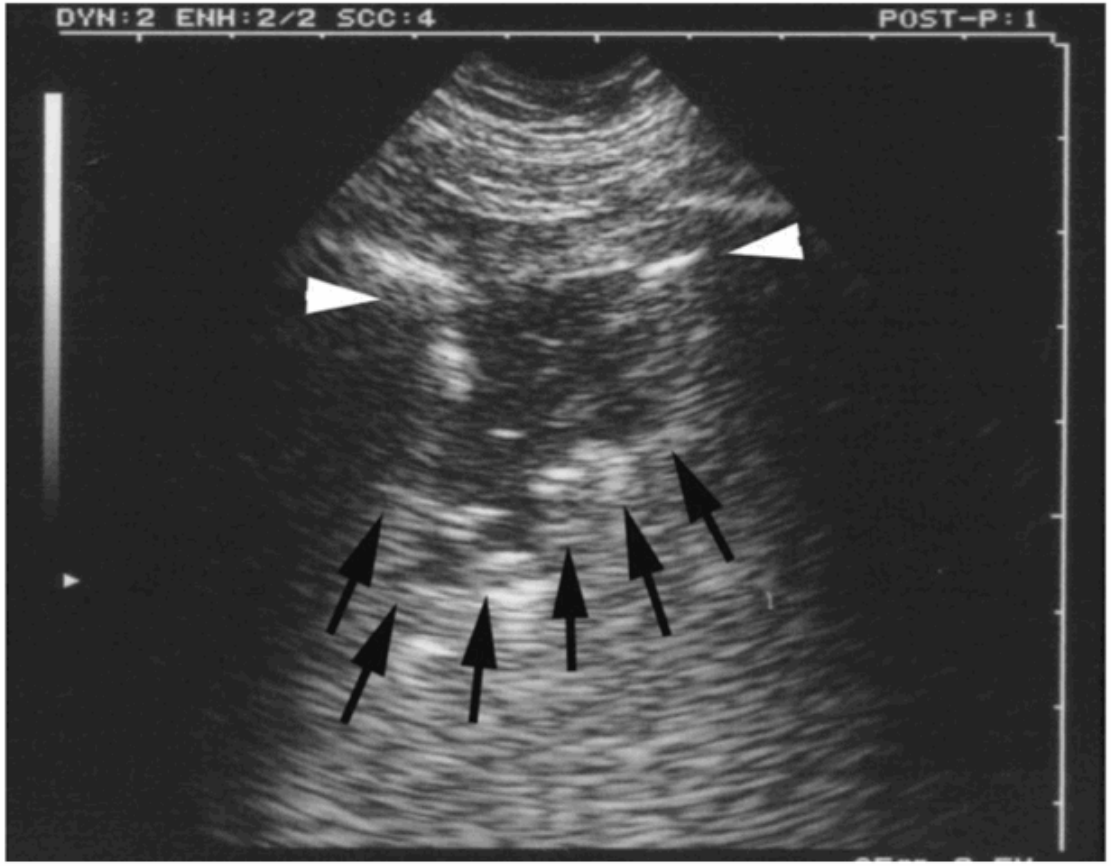
- In early pneumonia fluid fills only some of the alveoli
- Where fluid filled alveoli are surrounded by air filled lung (B-lines)
- In the appropriate clinical setting a localised patch of numerous B-lines, often with tiny areas of sub pleural consolidation, suggests early pneumonia



Irregular consolidation

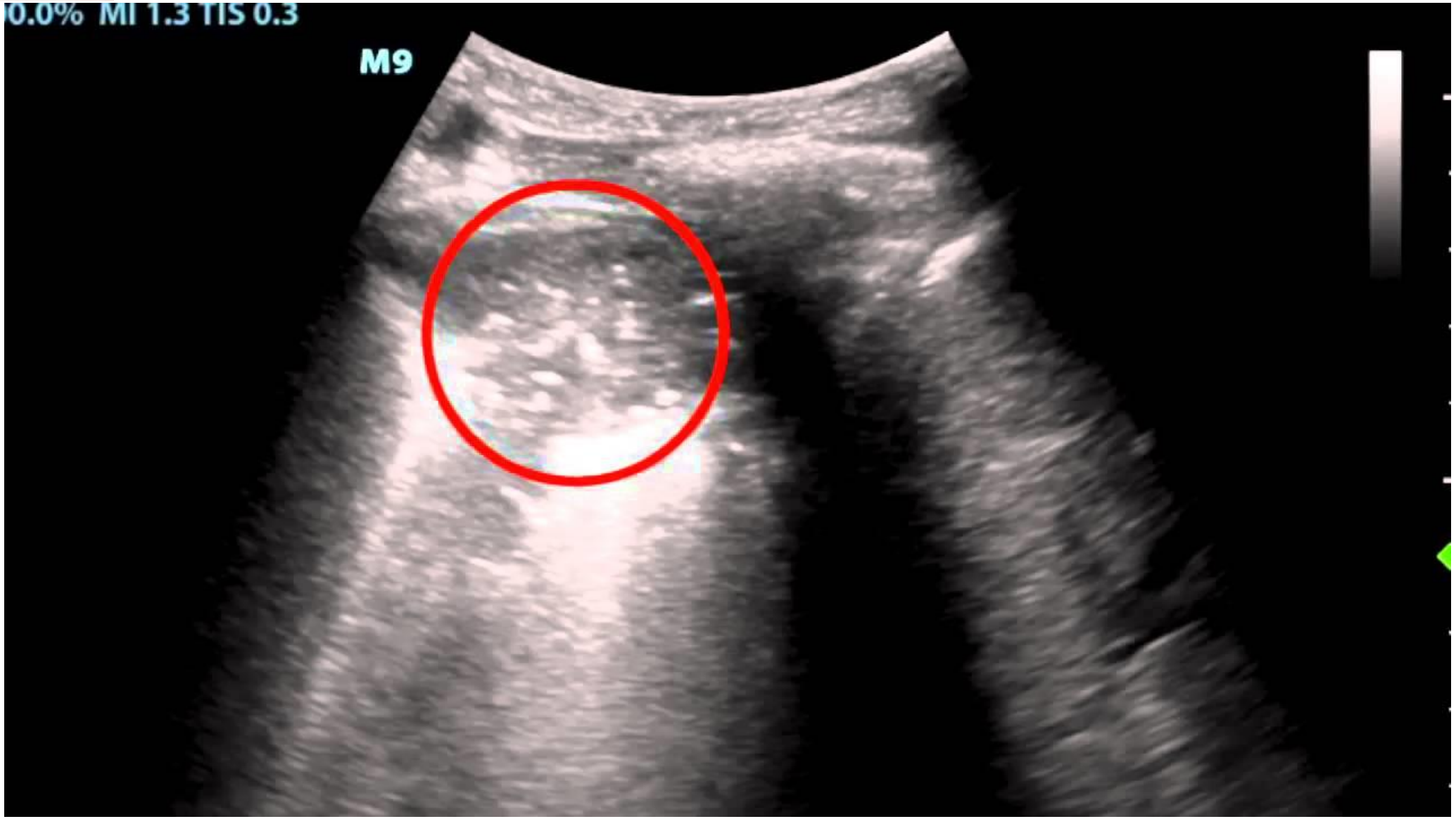
If there is lobar consolidation the borders of the consolidated areas will be linear and well defined – as consolidated and aerated lung lie adjacent on opposite sides of the linear pleural fissures.

More commonly there are smaller areas of consolidation. Where these abut the pleural surface they are linear, but their deeper borders usually demonstrate an irregular interface with underlying aerated lung. This irregular junction between consolidated and aerated lung is known as the “shred sign”



Shred sign: aerated lung tissue adjacent to a consolidated area reflects ultrasound waves, obscuring any distant structure (black areas indicate the area of “shredding”)

- Lichtenstein D Chest 2009; 135: 1421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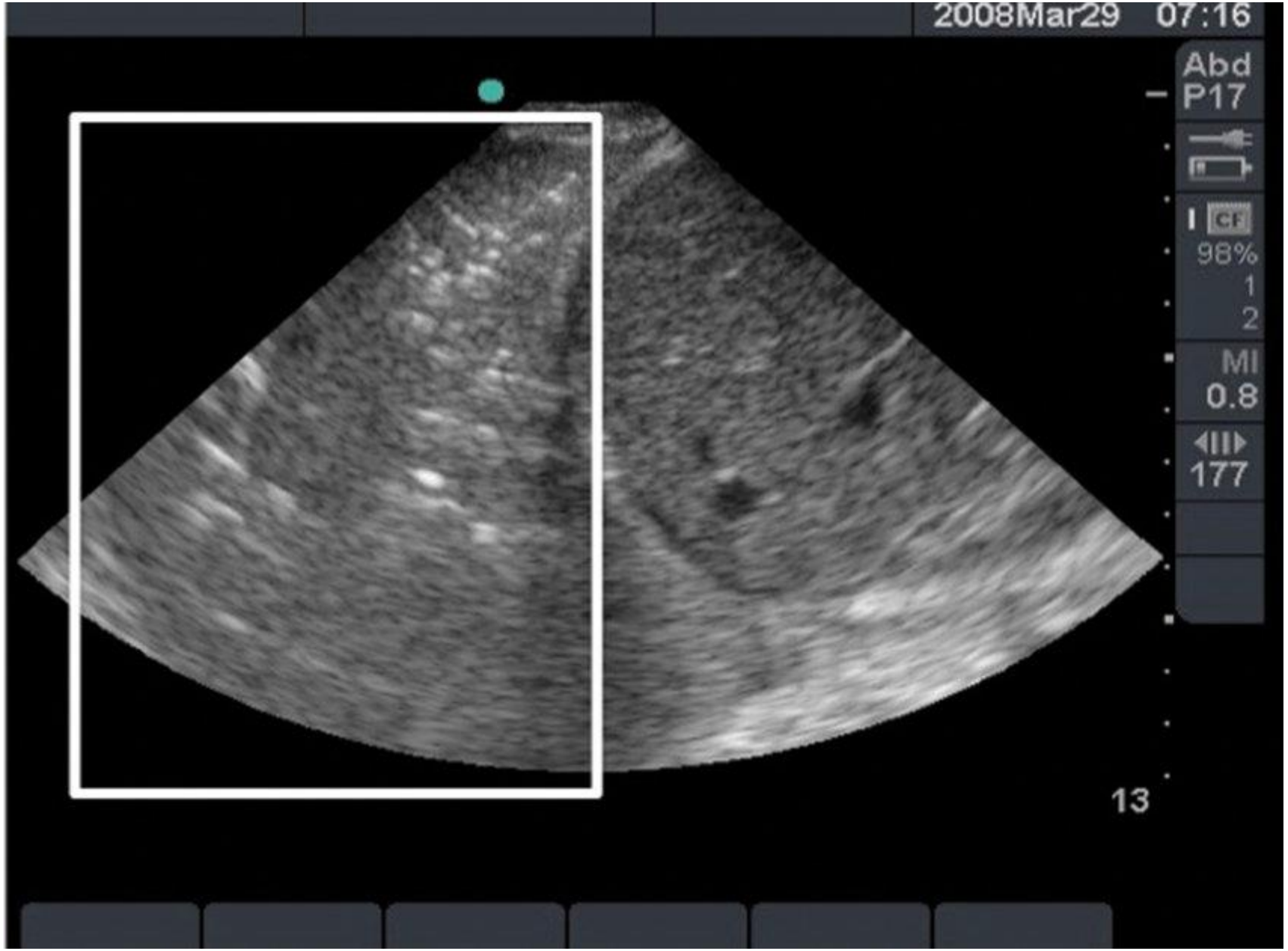
Pneumonia
Lung hepatization



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Pneumonia
Lung hepatization

- Pathologists have long described the mascroscopic changes associated with consolidation as “hepatization” of the lung
- The sonographic appearance of frank consolidation looks remarkably liver-like and is also termed **hepatization**

Solid appearing consolidated lung – hepatization

- Inflammatory and purulent fluid fills the alveoli and the lung appears solid, with a homogenous relatively fine echotexture similar to liver.
- Atelectasis also results in solid, non-aerated lung and differentiating the two conditions can be difficult.
- In pneumonia the volume of lung remains unchanged or actually increases, with airspaces filled with inflammatory liquid
- In atelectasis the alveoli are collapsed rather than fluid filled, and lung volume reduced

Associated pleural effusion or empyema

A small, hypoechoic parapneumonic effusion is frequently demonstrated

Echogenic debris within the effusion can suggest empyema

Υπερηχογραφική απεικόνιση πνευμονίας - Περιορισμοί της μεθόδου

- Το υποδόριο εμφύσημα αποτελεί έναν από τους σημαντικούς περιορισμούς της εξέτασης, βασιζόμενο στο γεγονός της αδυναμίας των ηχητικών κυμάτων να διαπεράσουν αεροπληθείς δομές

- Αποτιτανώσεις του υπεζωκότα, παρουσία συμφύσεων και πλευροδεσία είναι καταστάσεις που περιορίζουν τη χρήση του διαθωρακικού υπερηχογραφήματος

- Επίσης, σημαντική θεωρείται και η προαπαιτούμενη εκπαίδευση του εξεταστή, τόσο στην απεικόνιση του φυσιολογικού πνεύμονα και υπεζωκότα, όσο και στην αναγνώριση παθολογικών καταστάσεων