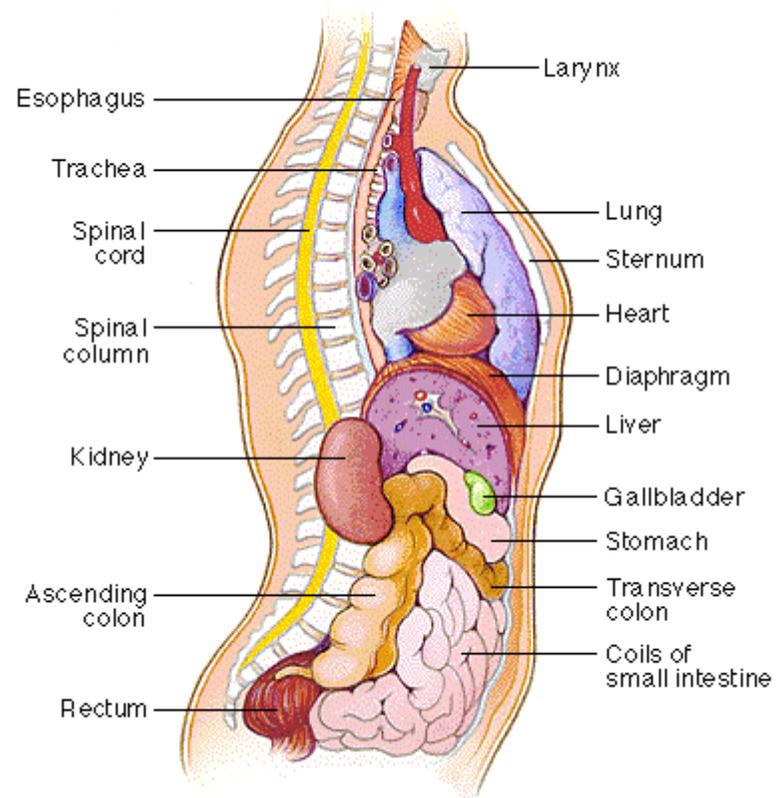
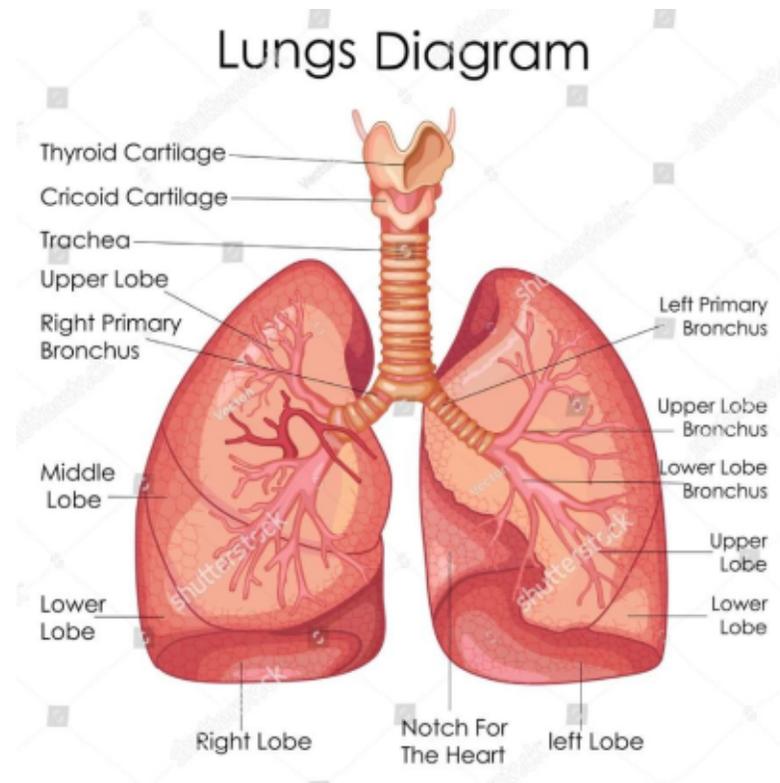


# CONTENT

1. Anatomy of Lung
2. Normal lung in ultrasound
3. Ultrasound manifestations of common lung diseases

## 2. Anatomy of Lung

The lung is the body's organ for gas exchange, and forms the respiratory system with the nose, throat, trachea, and bronchi. It is located in the thorax, above the diaphragm, on both sides of the mediastinum, one on the left and one on the heart. There are lobes, two left and three right, a total of five lobes.

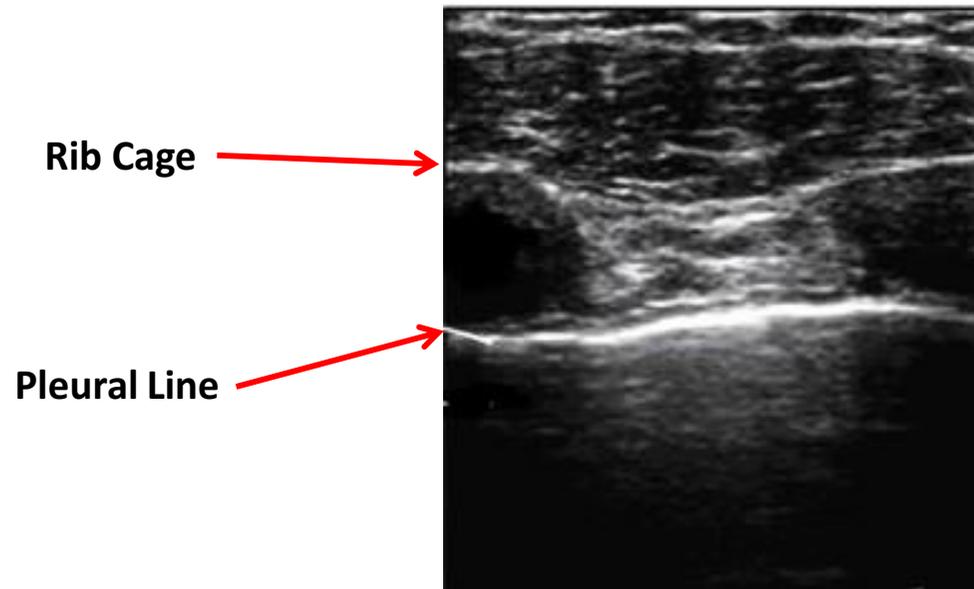


### 3. Normal lung in ultrasound

The probe should be perpendicular to the ribs and scanned longitudinally;

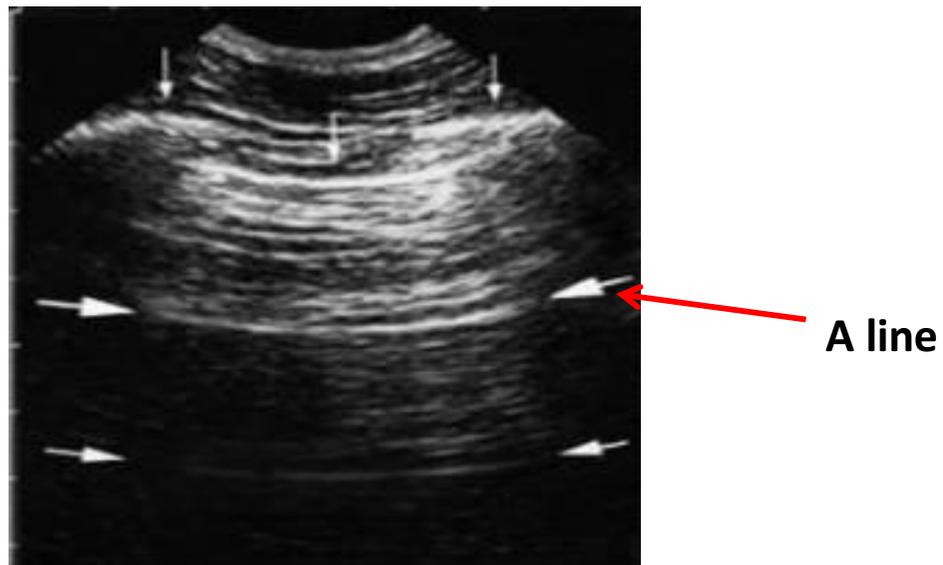
Determine the "rib line" based on the sound shadow behind the ribs;

At a depth of about 0.5 cm from the rib line, a hyperechoic line sliding back and forth with breathing movement is called a "pleural line". It forms a bat-like image with adjacent ribs and is called "bat sign."

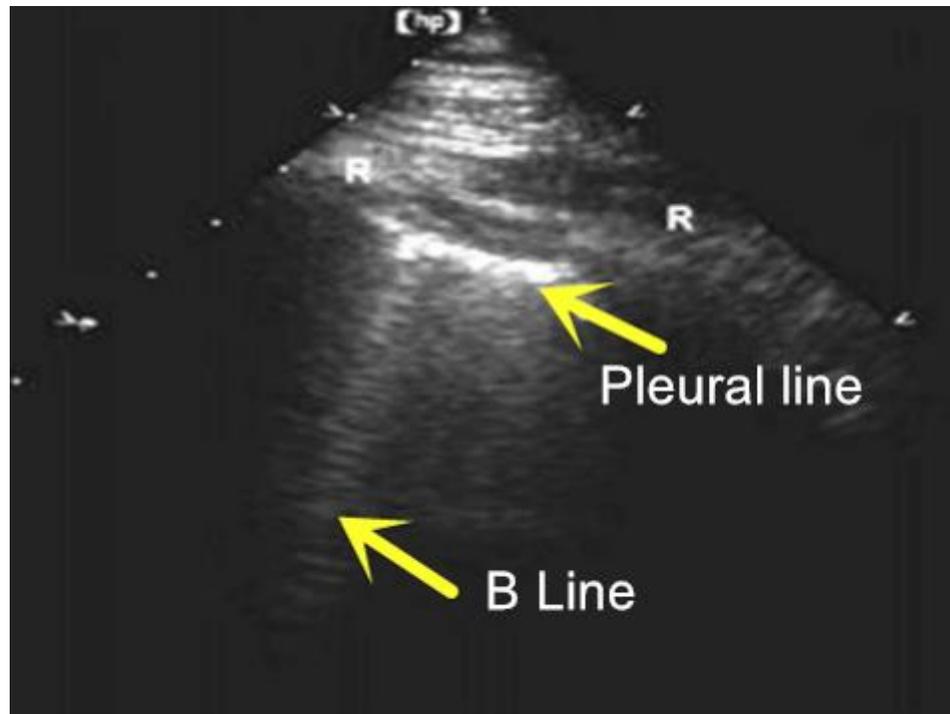


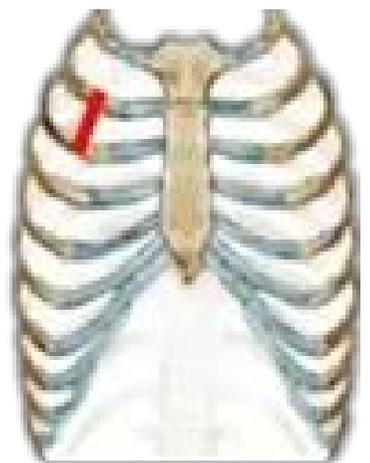
**When the ultrasound echo is projected vertically on the pleural-lung surface, reverberation artifacts can appear, which appear as multiple hyperechoes arranged at equal distances, and their intensity decreases in order, which is called "A line", also known as "horizontal line".**

**Therefore, the sonograms of normal lungs are characterized by "sliding sign" and "A-line".**



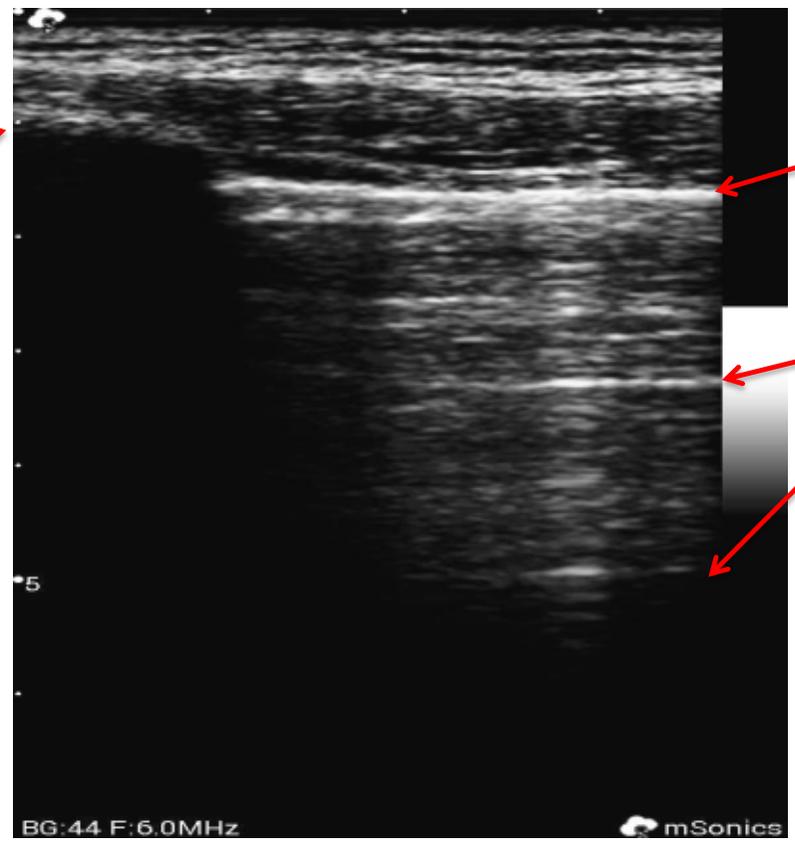
In addition, the "comet tail sign", which is emitted from the pleura and is perpendicular to the pleura, can be seen in the far field, which is called the "B-line", also known as the "vertical line". The B-line only appears in the last intercostal space of the lateral chest (the 10th intercostal side wall), and the number of B-lines generally does not exceed 3 in one scanning section.





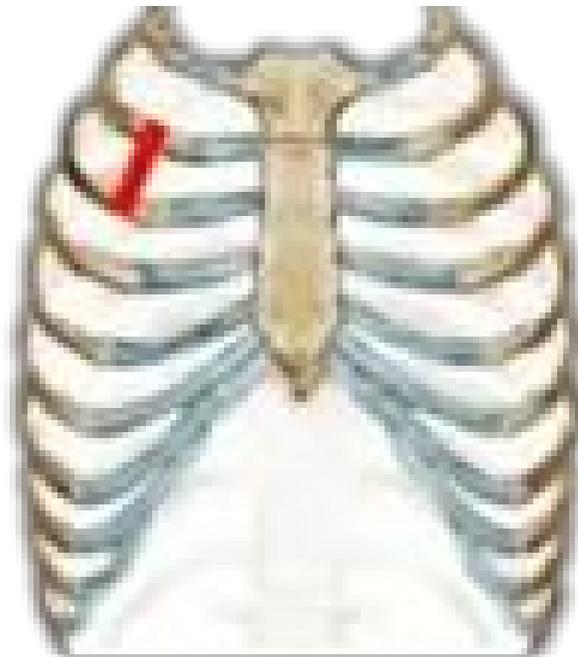
Ribs and Echoes

Longitudinal scan

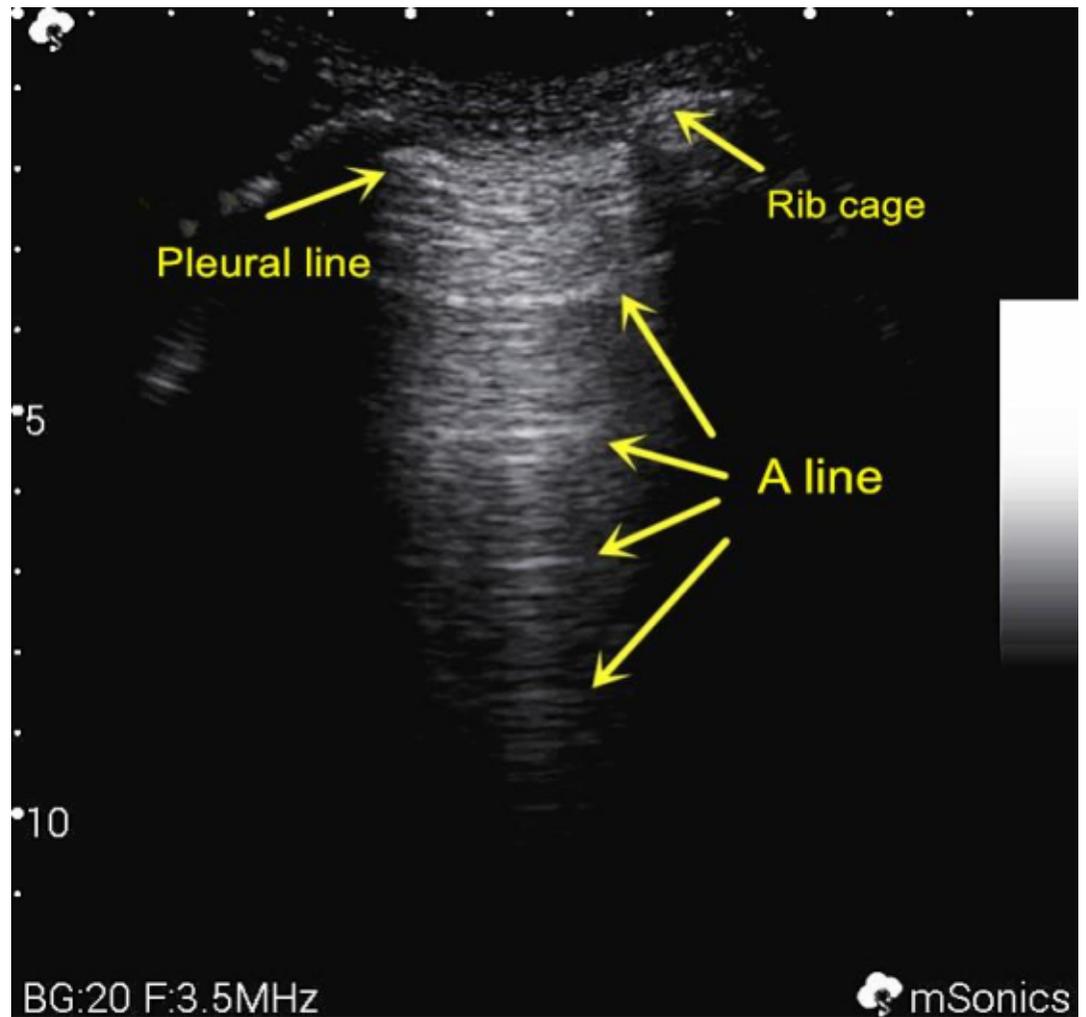


Pleura

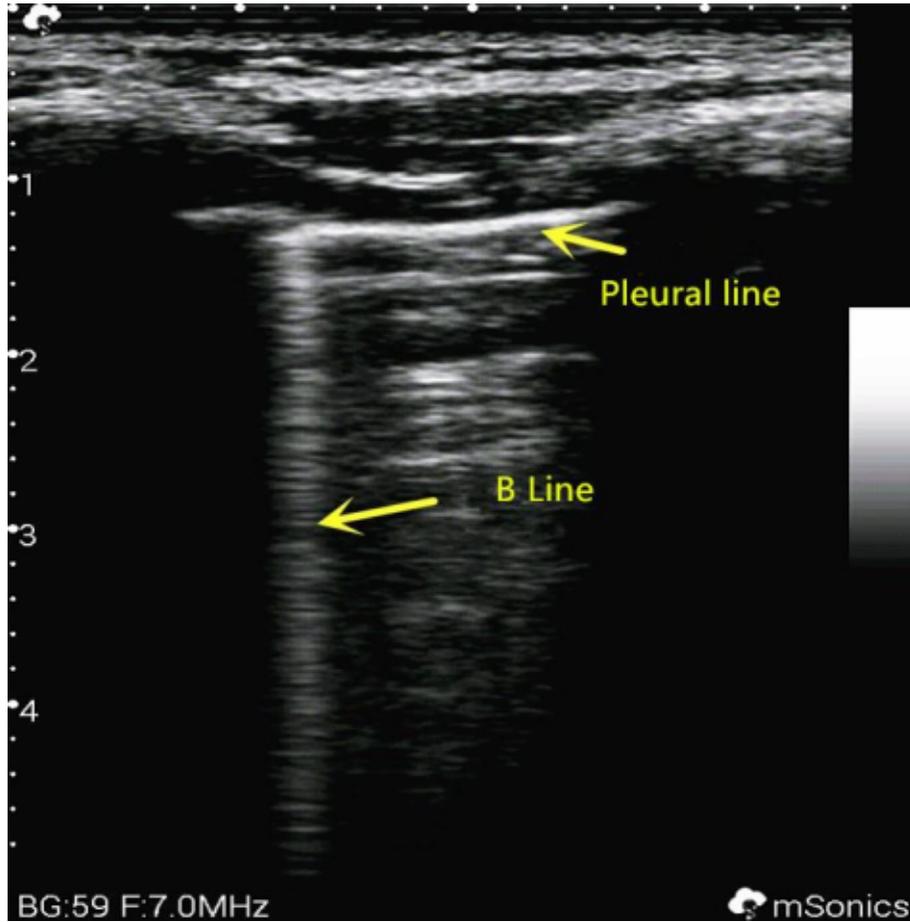
A-Line



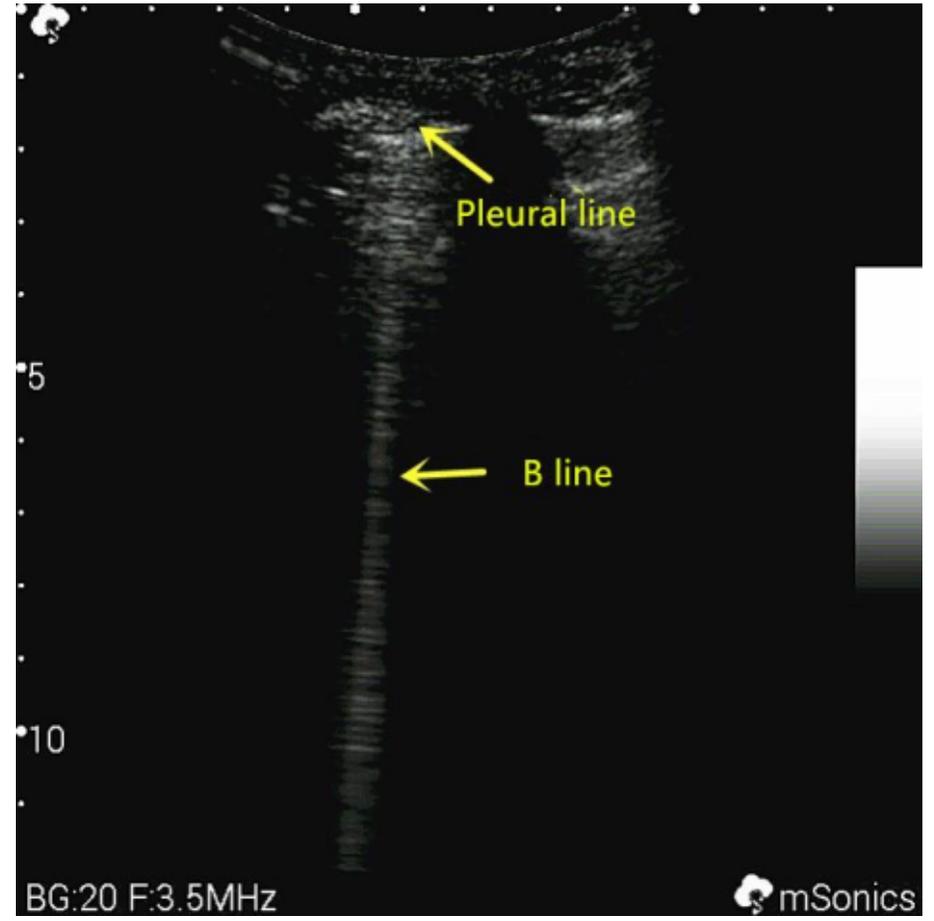
Longitudinal scan



Convex probe



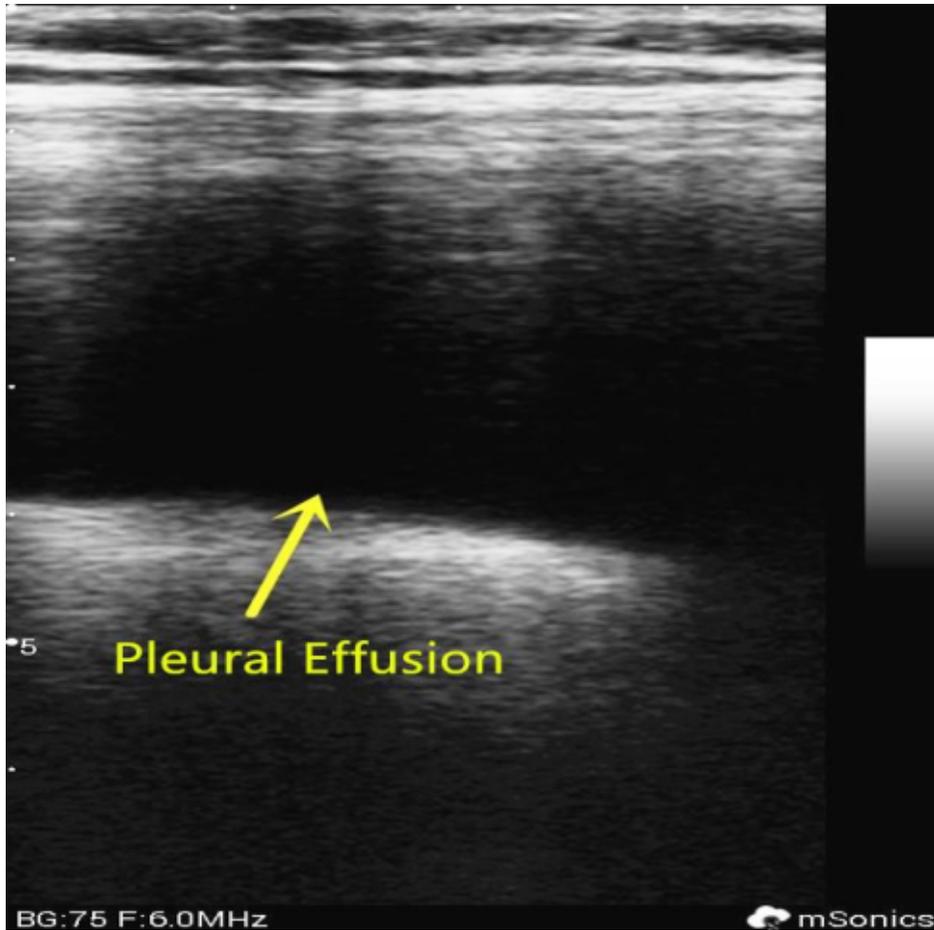
**Linear probe**



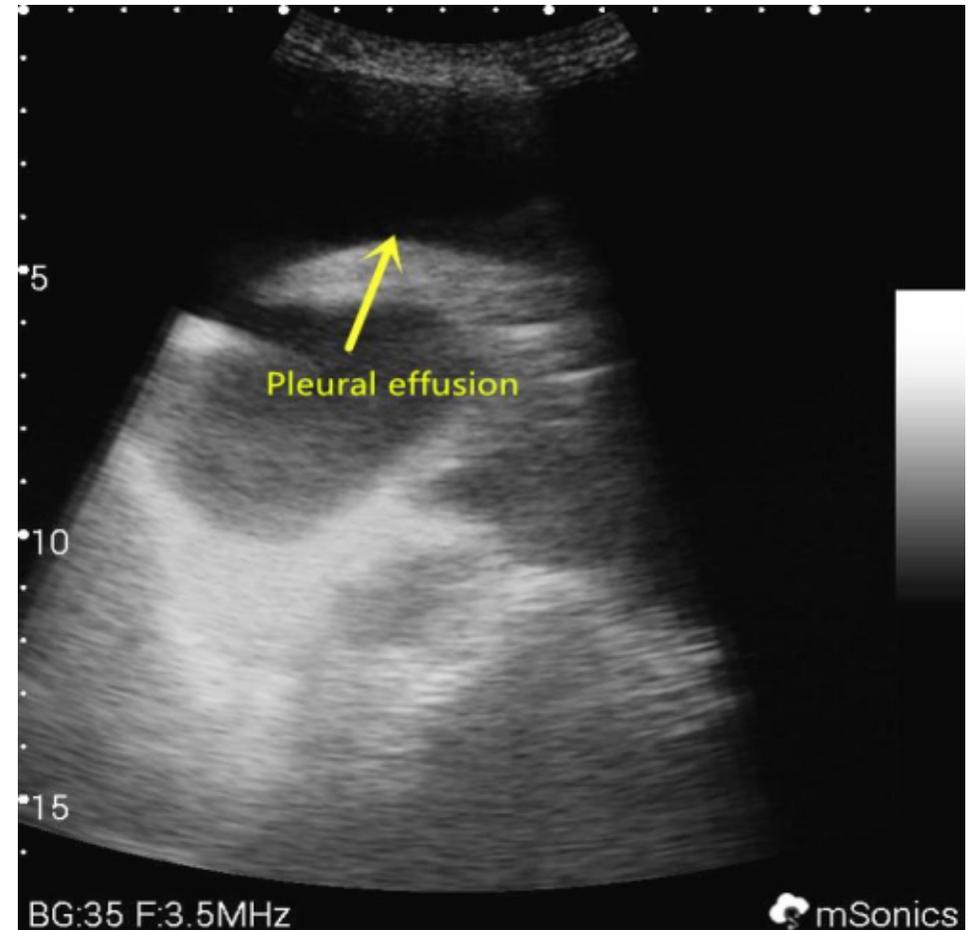
**Convex probe**

## 4. Ultrasound manifestations of common lung diseases

### A. Pleural Effusion



Linear probe



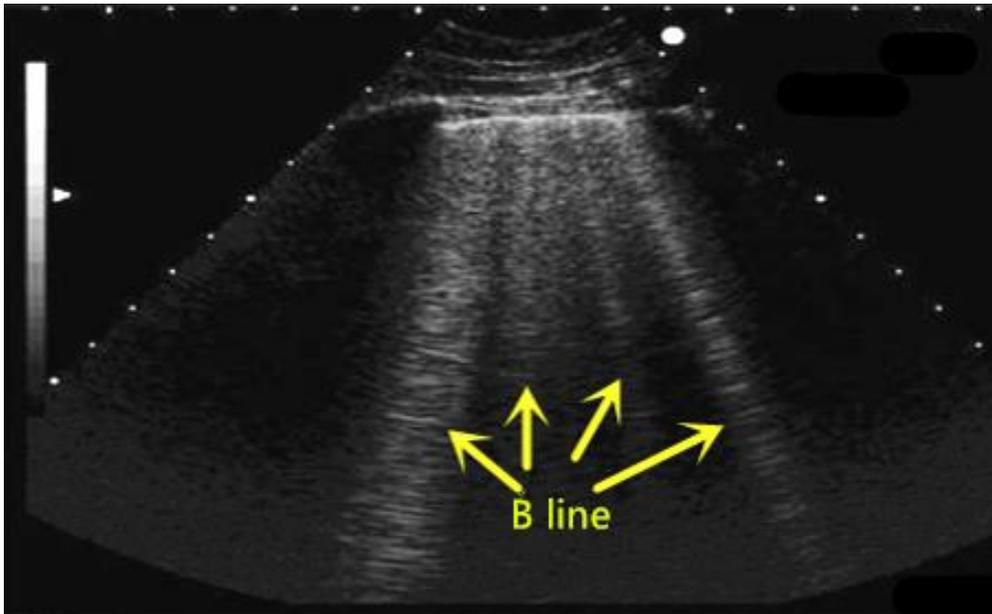
Convex probe

## **B. Pulmonary Edema**

**Due to the damage of pulmonary capillary endothelial cells and alveolar type II cells, pulmonary interstitial and alveolar edema and congestion are caused, the amount of fluid in the lung tissue increases, and ultrasound produces a strong reverberation at the interface between gas and water (the sound beam is reflected in the body Back and forth, forming multiple reflections).**

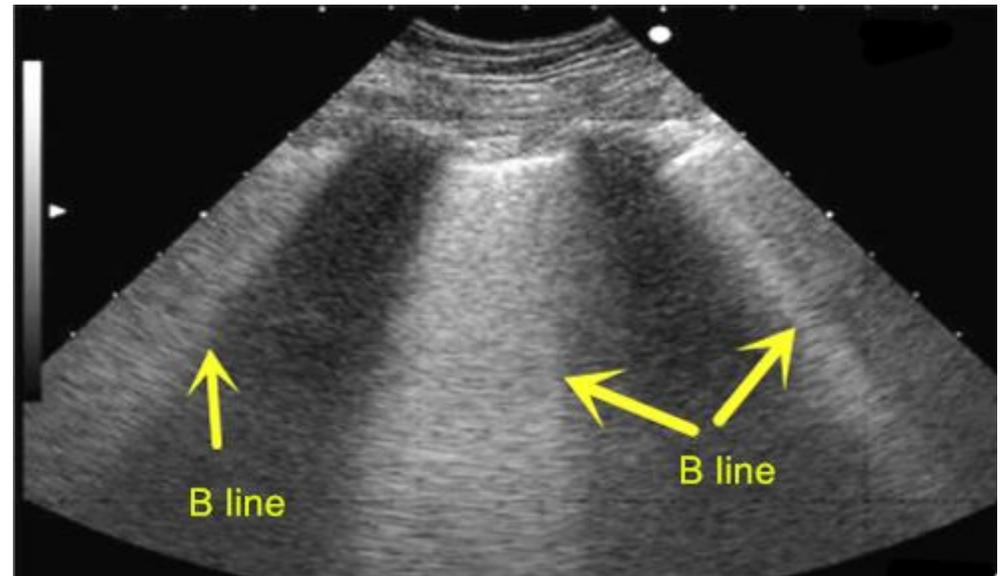
**You can see multiple B-lines in an ultrasound field, like a rocket launch, called the "pulmonary rocket sign"**

Interstitial pulmonary edema is characterized by a thickened lobe interval when the B-line spacing is 7 mm

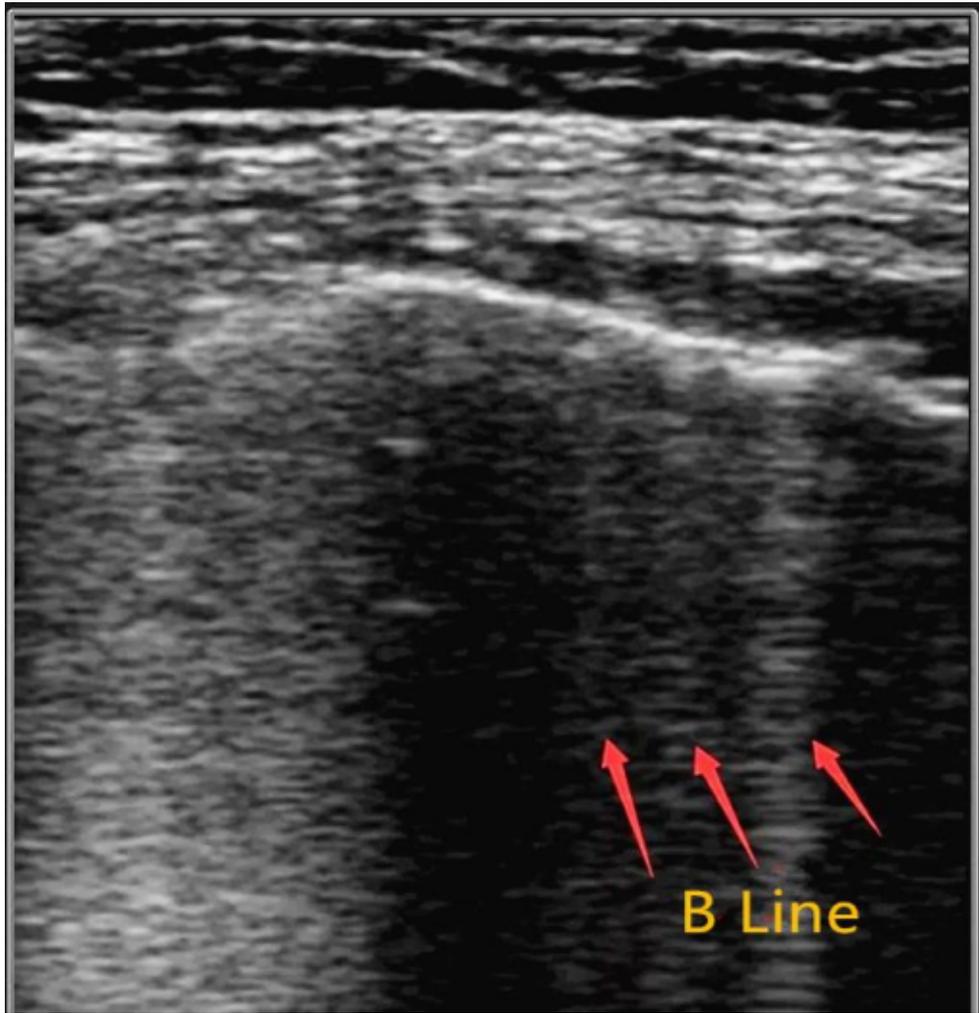


Convex probe

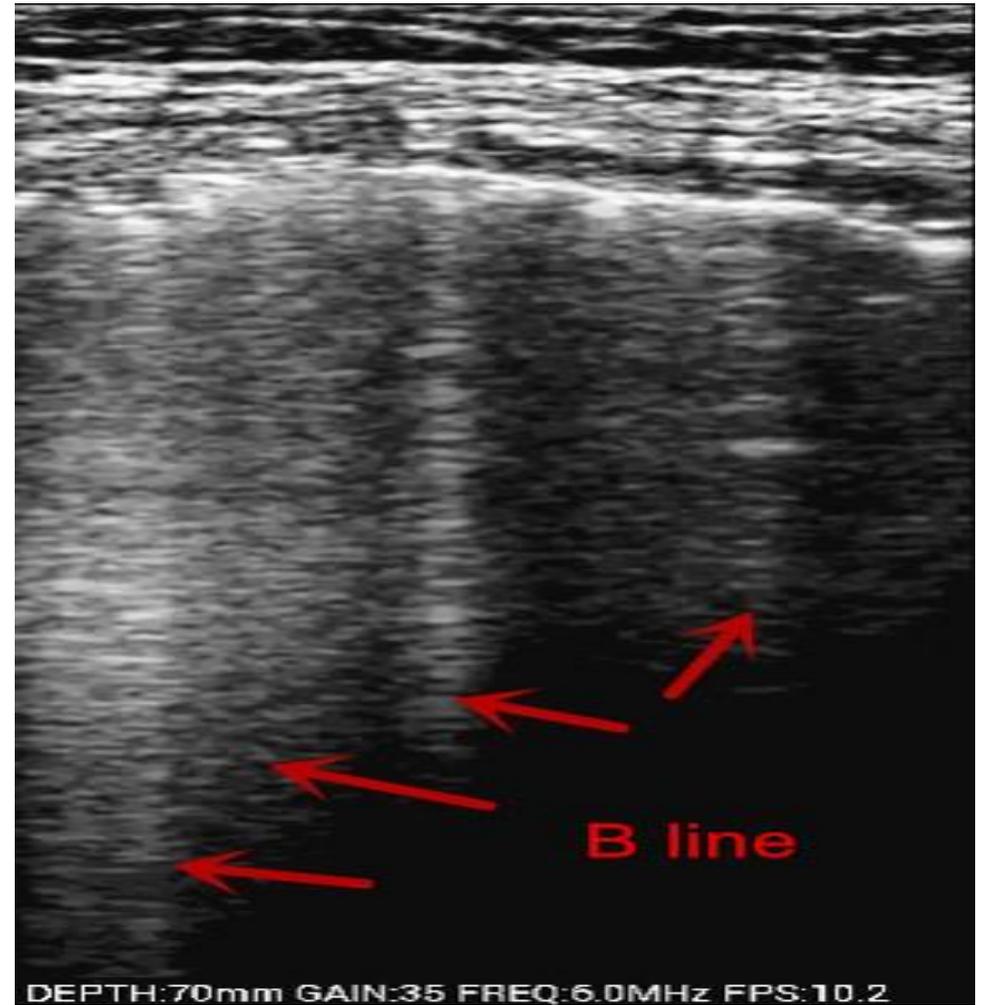
When the interval of B-line is 3mm or less, it shows "ground glass" like change, indicating pulmonary alveolar edema



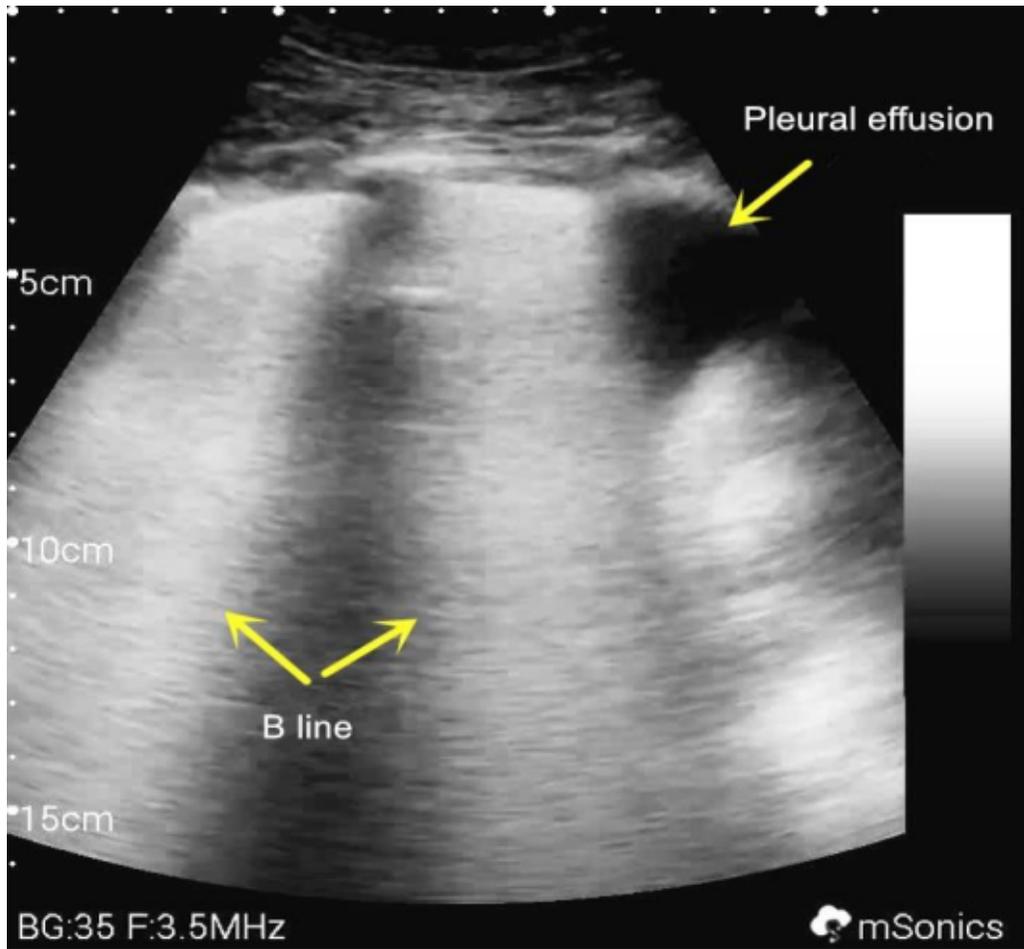
Convex probe



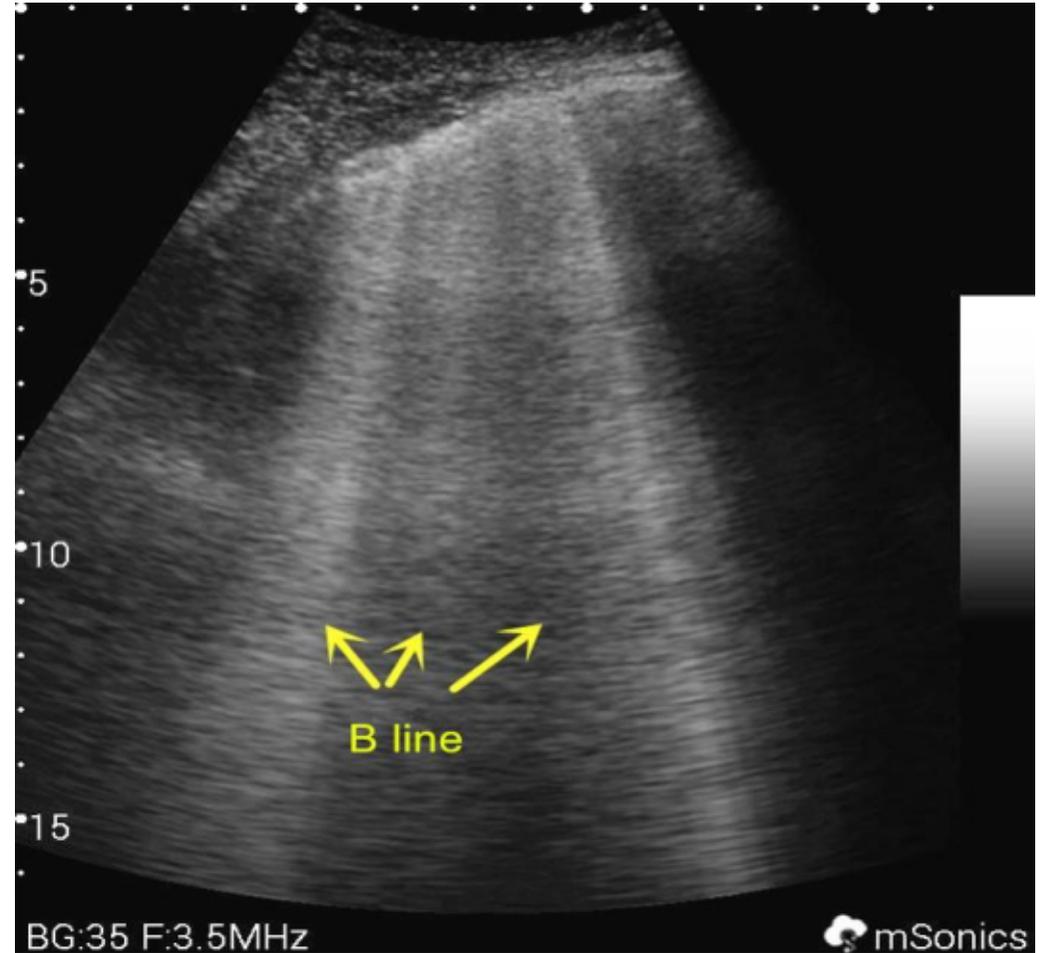
Linear probe



Linear probe



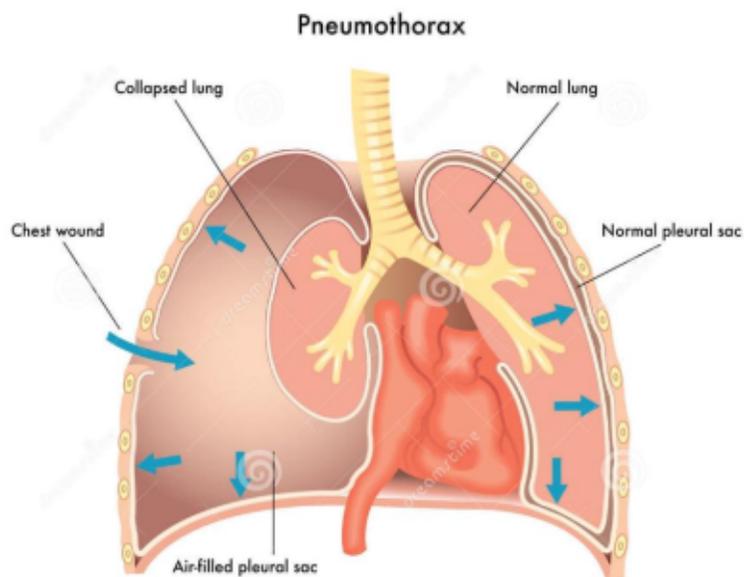
Convex probe



Convex probe

## C. Pneumothorax

Gas into the pleural cavity, resulting in a state of gas accumulation, known as pneumothorax. The lung group was mainly affected by lung disease or external force Rupture of the pleura in the textile and visceral layers, or rupture of small air bubbles near the lung surface, air escaping into the lung and bronchus Pleural cavity.



A-line echo intensity without diminishing change

## D. Pulmonary Consolidation

When the amount of fluid in the lung tissue increases, alveolar collapse, etc., solidified tissue is formed after the gas disappears. The consolidation lung echo resembles the liver. In the consolidation area, a point-like hyperechoic image can be seen, which has the feature of enhanced inhalation, and is called "air bronchus sign".

