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COVID-19 with Ultrasound

China-WHO Expert Team Announces Epidemiological Characteristics of Novel Coronary Pneumonia (2020/2/24)

1. Demographic characteristics: The average age of patients is 51 years, and 77.8% of patients are 30-69 years;
2. Transmission: respiratory droplets and contact transmission are the main transmission routes, and there is a risk of fecal-oral transmission;
3. Intimate contacts: 78% -85% of the clustered cases occurred in families and communities;
4. Susceptibility: Novel coronary virus is a new pathogen, and people of all ages are generally susceptible to infection.

The Chinese National Health Commission has announced the clinical diagnostic criteria for the trial of novel coronary pneumonia: fever and respiratory symptoms, epidemiological history, laboratory tests and chest imaging. Throughout the novel coronary pneumonia epidemic that is spreading in China, imaging technology such as CT and ultrasound, have played an important role in the diagnosis and guidance of pneumonia.

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Imaging Technology

CT

Features: Accurate

Disadvantages: Patients need to be transported and there is a risk of cross infection

Indications: Early case detection; accurate quantitative grading or staging; pre-discharged assessment

Ultrasound

Advantages: Mobility, dynamics, repeatability

Disadvantages: Unable to get full lung image

Indications: Diagnosis of pneumonia and pulmonary edema, mechanical ventilation management of ventilator, comprehensive assessment of cardiopulmonary in critically ill patients, assessment of complications

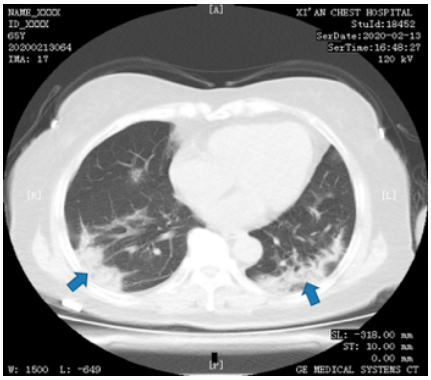

Figure 1

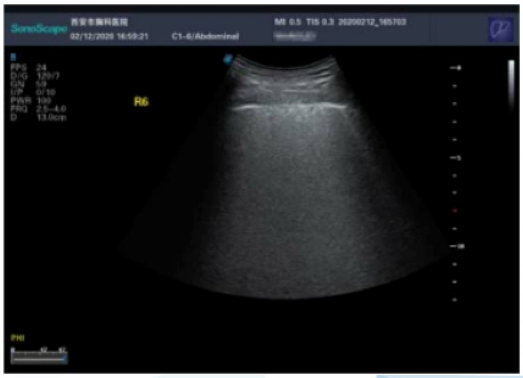

Figure 2

Figure1 & 2: CT showed ground glass opacity, cloudy shadows under the pleura in the posterior lower field of the right lung, air bronchogram sign and air bronchiologram sign. The linear array probe showed the pleural line in the right posterior lower area was unsmooth, with crazy-paving pattern, and the roughness was discontinuous. The convex array probe showed the pleural line in the right posterior lower area was unsmooth and thin with diffused B lines and “white lung" sign. A lines disappeared.

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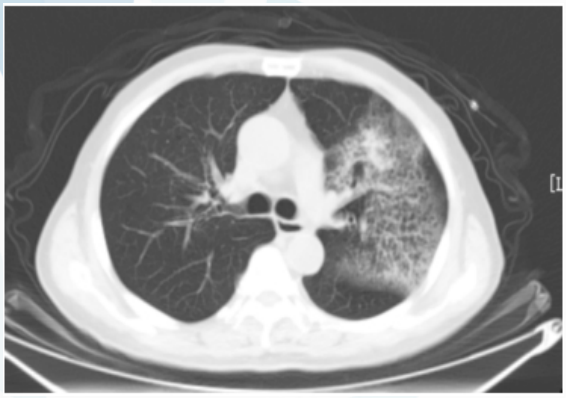

Figure 3

Figure4

Figure 3 & 4: CT showed ground glass opacity and reticular shadows under the pleura in the field of the left lung. The convex array probe revealed B lines in the left posterior lower area and A lines disappeared. Small patchy lesions were observed, and the pleural line was discontinuous (red arrow).

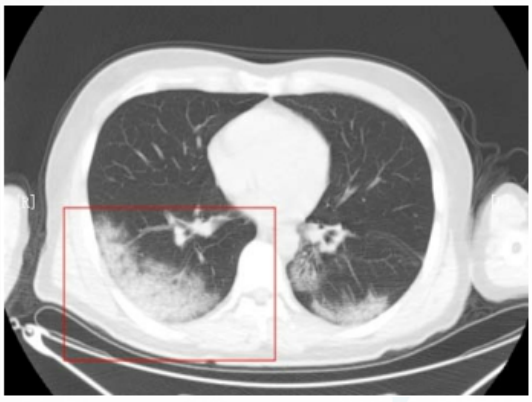

Figure 5

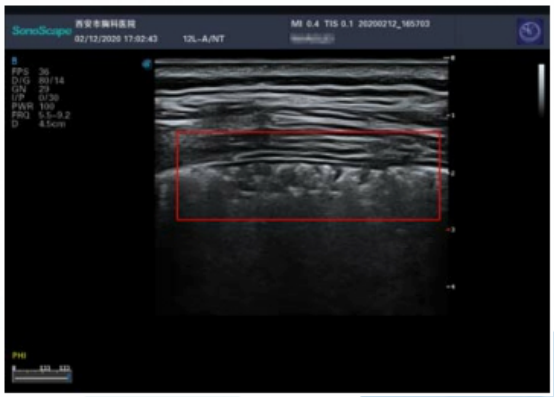

Figure 6

Figure 5 & 6: CT showed large patchy reticular softening lesions under the pleura in the posterior basal segment of the lower lobe of the right lung. Linear array probe showed discontinuous pleural line in the right posterior lower area and strip consolidation, air bronchogram sign, crazy-paving pattern, and significant signs of interstitial disease, with a large number of B lines.

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Faced with a large number of patients with COVID-19 infection, medical institutions have encountered practical difficulties:

1. Thick protective equipment prevents clinicians from using stethoscopes;
2. Critical patients cannot be transferred to the CT room, and rapid changes in conditions require repeated imaging examination.

How to do？

1. How to quickly and easily assess changes in lung conditions when stethoscope and CT are missing
2. How to quickly and easily assess changes in cardiac function and circulation capacity
3. How to quickly screen for basic diseases such as liver, kidney and complications

In the strictly isolated NCP ward, ultrasound has a unique advantage. It has become a visual "stethoscope" for clinicians. In the ICU ward, combined cardiopulmonary ultrasound can achieve the evaluation of three key factors of cardiac function, circulation capacity and pulmonary edema. The BLUE program quickly diagnoses the causes of dyspnea and shock, clarifies the treatment direction, and evaluates the treatment effect.