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Coronavirus disease 2019 (COVID-19) is a global public health emergency. Since the first diagnosis in Wuhan, China, the infection has spread rapidly to the rest of the country and to more than 25 countries around the world, as reported in the World Health Organization European Region. The typical symptoms are fever, cough, changes in sense of smell, headache, and diarrhea, and it can cause severe acute respiratory syndrome in some patients.

Chest computed tomography (CT) is the imaging method of choice in the diagnosis of COVID-19. The hallmarks of COVID-19 on CT scan are bilateral, subpleural, ground-glass opacities with air bronchograms, ill-defined margins, and a slight predominance in the lower lobes and consolidative pulmonary opacities. Abnormal lung CT findings can be present even in asymptomatic patients, and lesions can rapidly evolve into a diffuse ground-glass opacity predominance or consolidation pattern within 1–3 weeks after onset of symptoms, peaking at around 2 weeks after onset. Chest x-ray (CXR) examination can reveal the disease only in advanced stages.

In pregnant women, the diagnosis of COVID-19 pneumonia is particularly challenging. Although chest CT is not contraindicated in pregnancy and remains the gold-standard technique for pulmonary pathologies, lung ultrasound (LUS) examination has been found to be an accurate imaging method to detect peripheral pulmonary and pleural conditions including pneumonia, with high accuracy (sensitivity >90% and specificity >95%), even in pregnancy.

Typical ultrasound findings of COVID-19 pneumonia are (1) a patchy distribution of interstitial artifactual signs (single and/or confluent vertical artifacts, small white lung regions), (2) an extended distribution of aforementioned interstitial artifactual signs to multiple areas of the lung surface, and (3) small subpleural consolidation with associated areas of white lung, following an agreed, tested, and standardized image acquisition protocol. The acquisition protocol includes 14 scanning areas (3 posterior, 2 lateral, and 2 anterior) along the paravertebral, midaxillary, and hemi-axillary lines (NCT04322487).

In our hospital, we studied the use of LUS to research findings of sonographic interstitial syndrome in a pregnant woman at 23 weeks’ gestation admitted for fever and cough on March 10, 2020, using a Wireless Ultrasound Probe Convex Color Doppler—C05C with a frequency of 3.5 MHz (ATL S.r.l., Milan, IT).

At admission, the pregnant woman was eupneic with spontaneous breathing in ambient air. Her peripheral oxygen saturation was 98%. On auscultation, vesicular sounds were reduced bibasally. Ultrasonographic assessment was performed with the first operator scanning the patient with the probe and the second operator outside the room.
evaluating images and videos—in real time—exploiting wireless technique to reduce operators’ exposure to contamination (Video 1).

The obstetrical ultrasound examination revealed a normally grown fetus with normal amniotic fluid and Doppler parameters.

At LUS examination, the patient showed (1) diffuse hyperechoic vertical artifacts with thickened pleural line and (2) “white lung,” with patchy distribution, on 3 of 14 predetermined scan sites (Figure, B and D) (Video 1). CXR, performed on the same day, was not suggestive of viral pneumonia (Figure, A). Throat swabs for the novel coronavirus (2019-nCoV) by real-time polymerase chain reaction confirmed the diagnosis of COVID-19 pneumonia.

**Discussion**

Point-of-care LUS examination could play a key role in the assessment of pregnant women with suspected 2019-nCoV infection. In particular, in this case, LUS findings were crucial to indicate antiviral treatment in the presence of substantially normal CXR.

It is worth underlining that we decided to perform CXR examination because of its different contribution in terms of imaging findings compared with LUS. In particular, CXR allows a panoramic view, giving information also regarding thoracic—not only pulmonary—zones not detectable at ultrasound examination. In contrast, LUS examination has a better sensitivity for pneumonia referring to focal alterations of peripheral airspace geometry of the lung. Moreover, CT scan was not performed because we did not need further information to plan management and start treatment.

From the current clinical evidence, LUS patterns of subjects with COVID-19 pneumonia include a patchy distribution of interstitial artifactual signs (single and/or confluent vertical artifacts, small white lung regions). Subsequently, these patterns extend to multiple areas of the lung surface. The further evolution is represented by the appearance, still patchy, of small subpleural consolidation with associated areas of white lung. The evolution in consolidations, especially in a gravitational position, with or without air bronchograms, and their increasing extension along the lung surface indicate the evolution toward the phase of respiratory insufficiency.

Studies aimed at clarifying the diagnostic and prognostic role of LUS in COVID-19 are urgently needed, especially in pregnancy. The well-known advantages of LUS in terms of portability, bedside evaluation, safety, and possibility of repeating the examination during follow-up cannot be overlooked and should be exploited and implemented. Moreover, the possibility of performing LUS examination at bedside minimizes the need of transferring the patient, which poses a potential risk of further infection spreading to the healthcare personnel.

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