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IMAGES IN EMERGENCY MEDICINE

Imaging

Man with dyspnea, dry cough and fever

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1 | PATIENT PRESENTATION

A 60-year-old-man was admitted to the emergency department (ED) with dyspnea, dry cough, and fever. His vital signs showed tachypnea and hypoxemia ($SatO_2$ = 85%). The result of reverse transcription polymerase chain reaction for detection of severe acute respiratory syndrome coronavirus 2 RNA was positive. Forty-eight hours after admission, the patient required invasive mechanical ventilation with high inspired oxygen fraction levels and positive end-expiratory pressure titration, so prone position ventilation was started. The patient developed hemodynamic instability; the inferior vena cava (IVC) and the hepatic vein flow were evaluated by a transhepatic (TH) view with bedside ultrasonography. Using a phased array sector probe 2–3 mHz, the operator obtained the images on the right side of the patient (Figure 1A). The probe was placed in the 7th–8th intercostal space at the posterior axillary line with the marker pointing to the patient's head (Figure 1B). The IVC and the hepatic vein (Figure 2) and the respiratory variation of the IVC (Figure 3) were adequately evaluated (Video S1). The Doppler evaluation of hepatic vein flow showed a normal pattern (Figures 4 and 5). A high IVC distensibility index (44%) was reported (along with a central venous pressure of 8 mm Hg); then, a bolus of crystalloid was administrated with improvement in the hemodynamics.

2 | DIAGNOSIS

The cause of the patient's hemodynamic instability was hypovolemia.

3 | DISCUSSION

Critical care ultrasonography is the best technique for hemodynamic monitoring in critically ill patients.[1] Given the high rates of prone position ventilation during the coronavirus disease 2019 pandemic, recent reports showed the possibility to perform transthoracic echocardiography (TTE) in this position. One limitation of this approach is the difficulty to obtain a subcostal view to evaluate the IVC.[2] A recent report described the possibility to visualize the IVC with the subcostal view during prone position[3]; however, this cannot be achieved in up to 20% of patients. The IVC can be visualized by a transhepatic approach with a significant correlation in the respiratory variation with the subcostal view.[4] In this case, we report for the first time the evaluation of the IVC with a transhepatic view during prone position ventilation in patients with acute respiratory distress syndrome and/or coronavirus disease 2019 infection. One limitation is that when aligning the M-mode cursor with downward deflection of the diaphragm in the transhepatic view, the evaluated portion of the IVC might not be in the same position as in the subcostal view. The diameter should be measured at the same location to avoid error. This technique allows acquisition of images with good quality and in a rapid manner without the need to mobilize the patient during the prone position.

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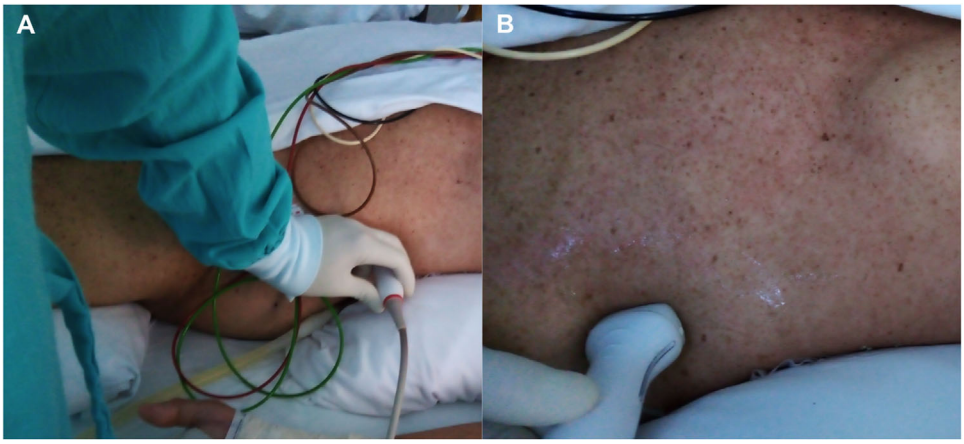

FIGURE 1 (A) The examination is performed on the right side of the patient. (B) The marker of the probe is oriented to the patient's head

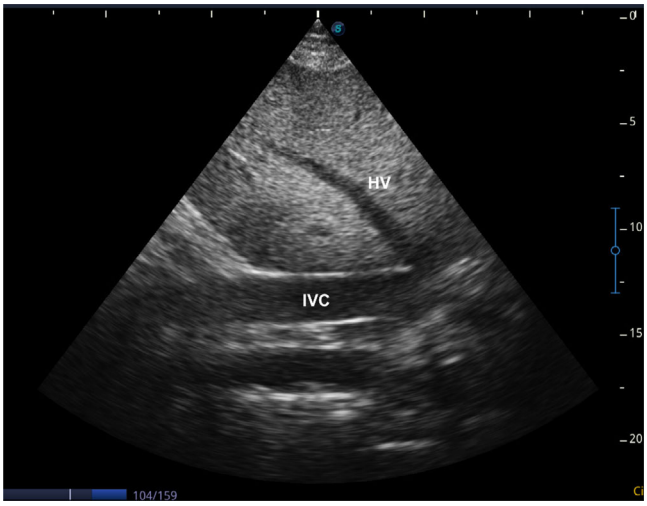

FIGURE 2 Transhepatic view of the inferior vena cava (IVC) and hepatic vein (HV)

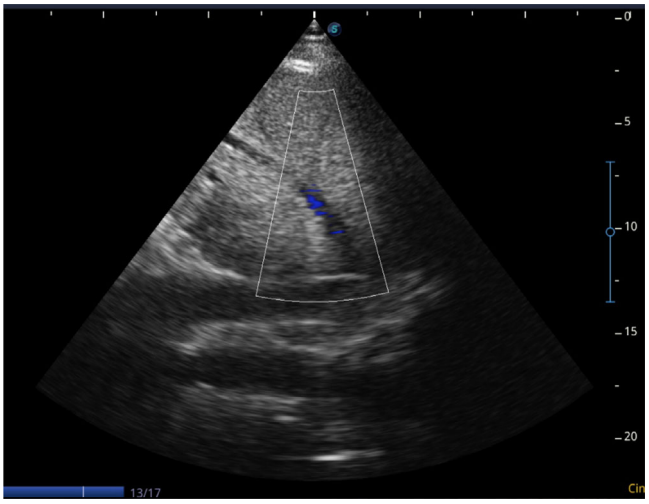

FIGURE 4 In color Doppler flow mapping, a blue hepatic vein waveform indicates flow away from the ultrasound probe

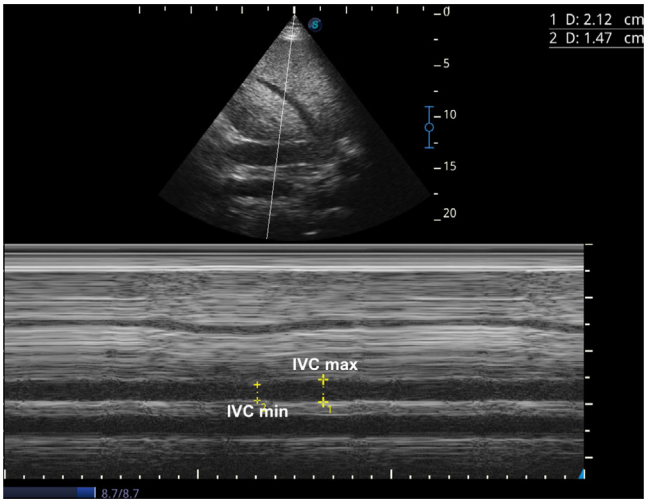

FIGURE 3 Aligning the M-mode cursor parallel with the IVC, its respiratory variation is measured and the distensibility index quantificated (IVC max − IVC min/IVC min × 100; a value ≥18% predicts fluid responsiveness)

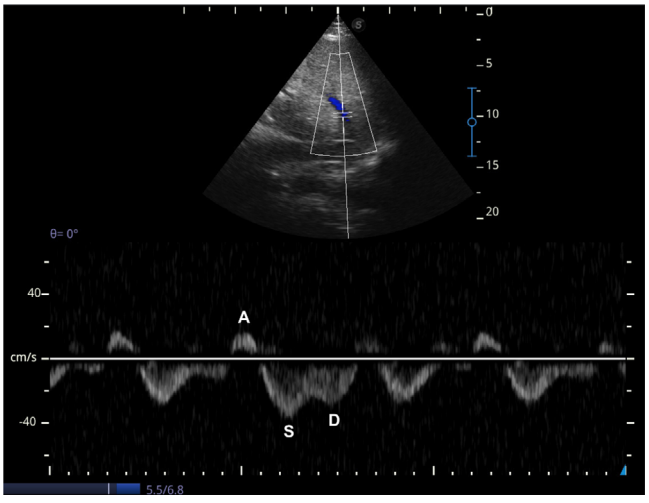

FIGURE 5 Normal hepatic triphasic venous waveform in pulsed wave Doppler (S wave > D wave). A-Wave, atrial contraction; D-Wave, ventricular diastole; S-Wave, ventricular systole

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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