

Using Bedside Ultrasound to Rapidly Differentiate Shock

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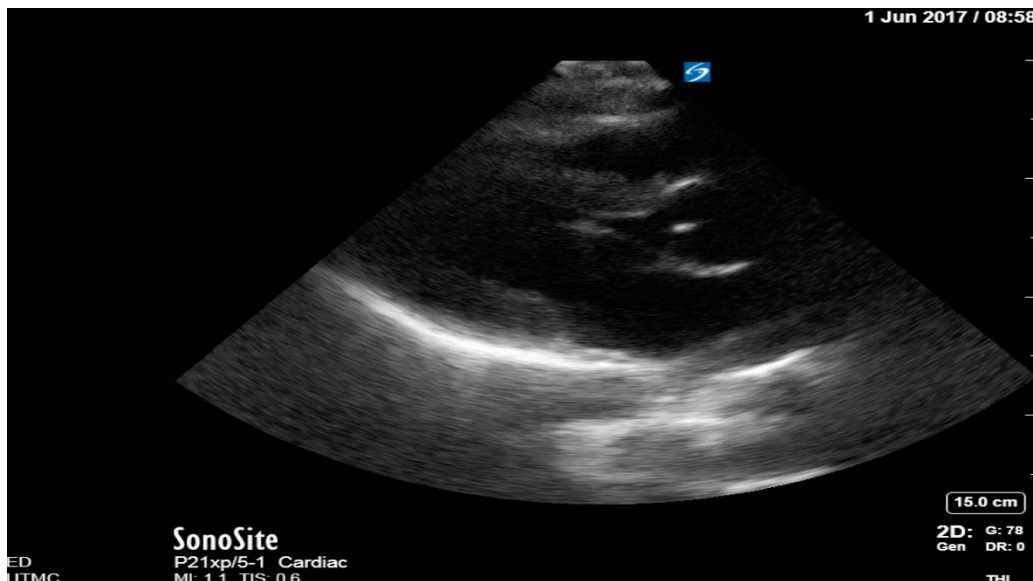
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Video Link: https://youtu.be/_yDz7AKTYpo



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History of present illness: A 62-year-old female presented from a nursing home for altered mental status. She had an initial Glasgow coma score of 9. Her blood pressure was 70/44 mmHg, temperature 36.8°C, heart rate 82/minute, respiratory rate 23/minute, and oxygen saturation 88% on room air. The patient's initial lactate was 3.1 mmol/L. A rapid ultrasound for shock and hypotension (RUSH) exam demonstrated the need for fluid resuscitation. 2 liters of normal saline was given, resulting in the improvement of her blood pressure to 93/53. Ultimately, the patient required intubation because of the severity of her pneumonia. A subsequent lactate of 0.8 mmol/L demonstrated adequate resuscitation.

Significant findings: A RUSH exam demonstrated hyperdynamic cardiac contractility and collapse of the inferior vena cava (IVC) with probe compression more than 50% suggesting hypovolemia likely secondary to sepsis. Incidentally, Morrison's pouch revealed a large right renal cyst but no signs of free fluid. A computed tomography of abdomen/pelvis showed a 10.8 x 9.5 cm right renal cyst and left lower lobe pneumonia.

Discussion: Sepsis is defined as organ dysfunction in a patient with a known source of infection. Signs of sepsis include hypotension, tachypnea, and altered mental status.¹ Although not a standard of care yet, the RUSH exam proves to be a valuable and rapid instrument to evaluate the cause of shock and hypotension in critically ill patients in the emergency department (ED). The components of the RUSH exam can be remembered by the mnemonic HI-MAP: heart, IVC, Morrison's/FAST abdominal views, Aorta, and Pneumothorax scanning.² Ultrasound can be used to quickly differentiate cardiogenic, distributive, and hypovolemic shock. RUSH has a sensitivity of 72.7% and specificity of 100% for shock with distributive etiology.³ Measurement of the IVC diameter can be used to estimate central venous pressure (CVP) and thus a patient's likelihood to respond to fluid resuscitation. A maximum IVC diameter of <2 cm with >50% collapsibility, such as in our patient, was found to correlate with a low CVP (<5 mm Hg).⁴ There are several

instances in which IVC measurement does not correlate to CVP, such as mechanical ventilation, valvular abnormalities, pulmonary hypertension, congestive heart failure, liver cirrhosis, elevated intra-abdominal pressures, and many other pathologies that affect flow to the right heart.⁵ Therefore, the RUSH exam should be interpreted with the patient's entire clinical presentation.

Topics: Sepsis, shock, hypotension, Rapid Ultrasound for Shock and Hypotension (RUSH), ultrasound, pneumonia.

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