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## Elderly Female With Abdominal Pain and Hypotension

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**IMAGES IN EMERGENCY MEDICINE****Ultrasound****Elderly female with abdominal pain and hypotension**

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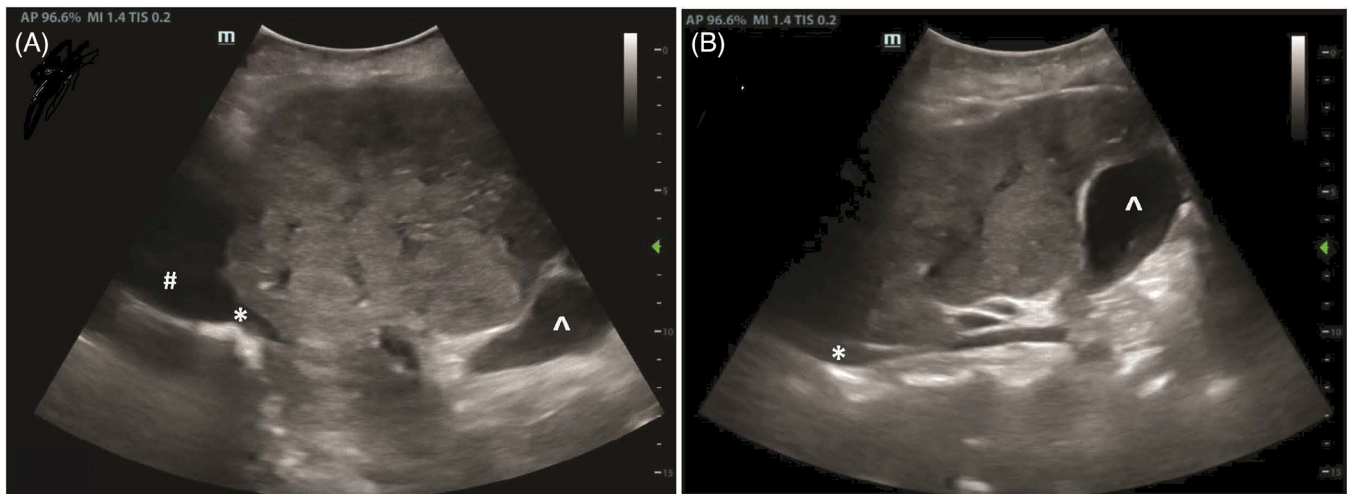
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Email: [mx677@jefferson.edu](mailto:mx677@jefferson.edu)**1 | PATIENT PRESENTATION**

A 65-year-old female with a history of metastatic lung cancer presents with abdominal pain and dyspnea. In the emergency department, she was noted to be hypotensive when lying supine; this improved when she was allowed to sit upright. As part of the Rapid Ultrasound for Shock and Hypotension (RUSH) protocol, cardiac and inferior vena cava (IVC) views were obtained (Figure 1).

**2 | DIAGNOSIS: INFERIOR VENA CAVA SYNDROME DUE TO HEPATIC MASSES**

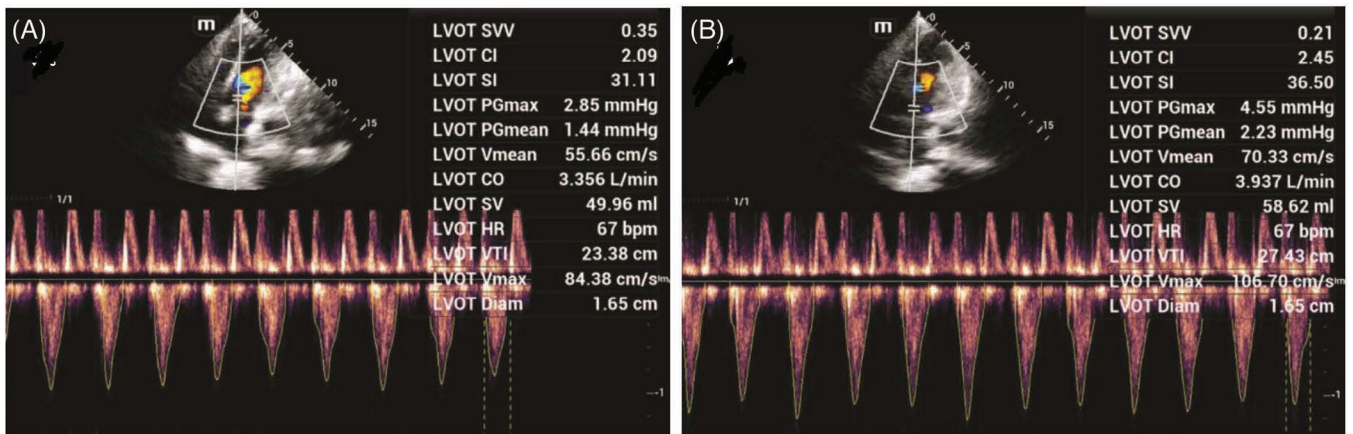
Bedside ultrasound demonstrated hepatomegaly with a compressed IVC that was difficult to visualize when supine. The IVC became more visually apparent when upright, suggesting extrinsic compression from hepatomegaly due to liver metastasis. Cardiac output (CO) was calculated in the apical 5 chamber view using velocity–time inte-



**FIGURE 1** Inferior vena cava (IVC) ultrasound in the sagittal plane with the patient supine (A) and upright (B). The IVC (star) is seen emerging from the right atrium (hashtag). When supine, the liver causes extrinsic compression, making it difficult to visualize the IVC. When upright, the IVC becomes more visible as the compression is lessened. Of note, the gallbladder (upward arrow) is also seen in both views.

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**FIGURE 2** Cardiac output (CO) calculations using velocity-time integral (VTI) of the left ventricular outflow tract (LVOT) with the patient supine (A) and upright (B). Going from supine to upright causes the CO to increase from 3.36 to 3.94 L/min.

gral (VTI) of the left ventricular outflow tract (LVOT) in both the supine and upright positions. This revealed that the patient's CO increased from 3.36 L/min when supine to 3.94 L/min when upright (Figure 2).

Inferior vena cava syndrome (IVCS) is most often caused by a primary thrombotic event but also can occur via extrinsic compression from adjacent structures. When the compression is caused by a late gestation gravid uterus, the term "supine hypotensive syndrome" is sometimes used. The subsequent decreased venous return can lead to hypotension, lower extremity edema, hypoxia, and end-organ failure.<sup>1</sup> Inferior vena cava diameter and collapsibility can be a valuable tool in assessing a patient's hemodynamic status. However, IVC measurements should not be used in isolation since there are several physiologic and anatomic pitfalls that complicate their interpretation.<sup>2</sup> Using LVOT VTI, stroke volume and CO can be calculated, giving the provider valuable insight into the patient's hemodynamic status. The basic approach can be found in several cited works, including Sattin

et al.<sup>3</sup> This patient was admitted to the hospital, where she transitioned to comfort-based care and eventually expired surrounded by family.

## REFERENCES

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