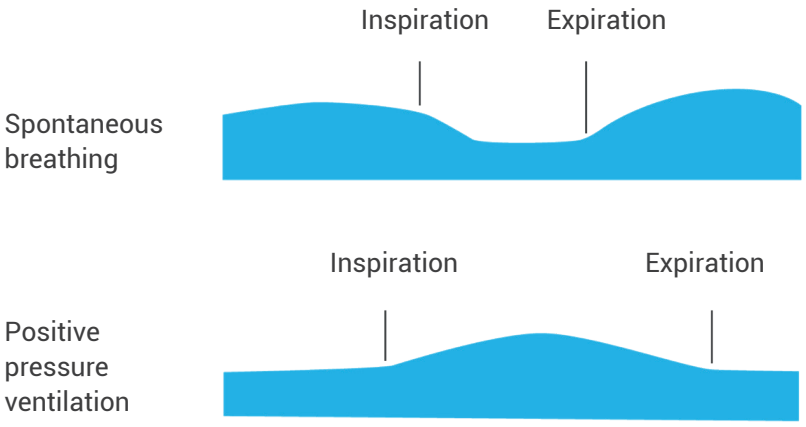
Volume status and fluid responsiveness

QUANTIFYING THE INFERIOR VENA CAVA (IVC)

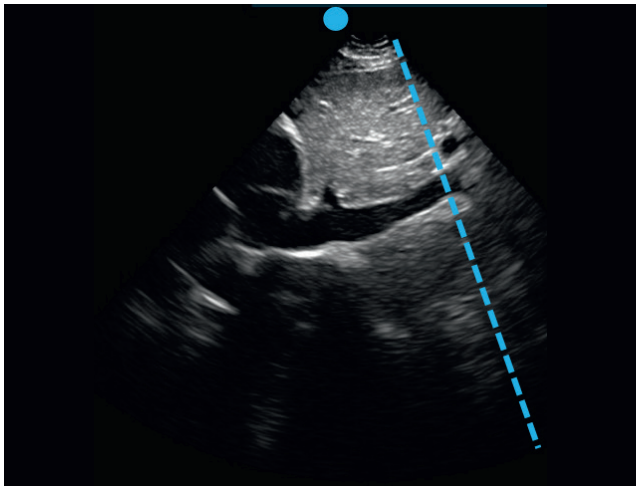
Ultrasound of the inferior vena cava (IVC) can be used as a part of volume status evaluation. IVC ultrasound is an unreliable predictor of fluid responsiveness in spontaneously breathing patients.

Technique

Images of the IVC are obtained in long-axis with a curvilinear or cardiac transducer. It is important to remember that the IVC changes diameter with respiration.



Change in the IVC diameter is measured with M mode, 2–3 cm distal to the junction of the hepatic vein and IVC.



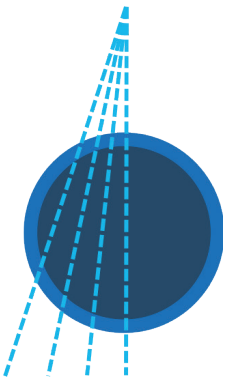
The IVC collapsibility index (CI) can be calculated as:

$$CI = \frac{IVC_{MAX} - IVC_{MIN}}{IVC_{MAX}}$$

Limitations

Technical issues can affect the reproducibility of IVC measurements.

The IVC may be insonated on an oblique angle, introducing error into the diameter measurement.



Respirophasic movement of the IVC or inaccurate caliper placement can also affect the accuracy of CI calculation.

Uses

IVC collapsibility and size does not reliably predict fluid responsiveness. In general, a narrow caliber IVC (< 1.5 cm) with greater than 50% collapse suggests that a patient will tolerate IV fluid (i.e., their condition will not worsen with fluid administration). Patients with a dilated IVC (> 2 cm) with < 50% collapse are less likely to respond to fluid, but may still benefit. Results of the IVC scan should be integrated with lung ultrasound and echo to assess the risk of pulmonary edema.