

## IVC

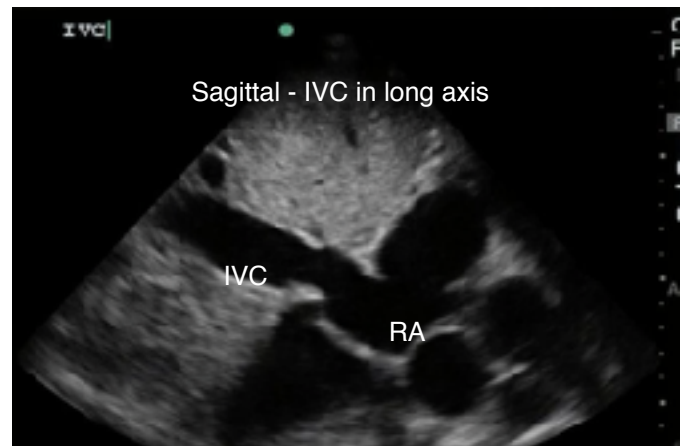
### I. Set up

- Transducer Selection: Phased array or curvilinear
- Preset: General cardiac or general abdominal
- Patient positioning: supine, consider having patient bend knees

### II. Scanning

#### 1. Method 1

- use phased array transducer to obtain a subxiphoid view of heart
- center RA on screen
- rotate transducer into sagittal plane while on the RA
- fan transducer to identify IVC at the point it enters the RA



#### 2. Method 2

- place the curvilinear array or phased array transducer in the sagittal plane in subxiphoid space as close to the xiphisternum as possible
  - this should put you just to the left of the IVC
  - an image of the liver will allow the beam to reach the posterior IVC
  - if the liver is NOT seen, an IVC image will be difficult to obtain... ensure the transducer is as close to the the xiphisternum as possible or slide the transducer slightly to the right to try and make make contact with the liver
- slide the transducer SLOWLY to the patient's right... the cylindrical IVC will appear deep to the liver
- rock the probe in the cephalad direction to bring the junction of the RA into view

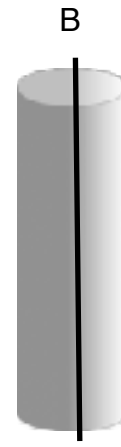
#### 3. Where to measure

- Measure the AP diameter in long axis
- 1 - 2cm distal to hepatic venous drainage (generally 2 - 4cm from junction of the IVC and RA) has been validated in the literature

- Prior to measurement manipulate probe to ensure the beam is passing through the center of the vessel to prevent foreshortening by catching the side of the vessel



The AP diameter of the image produced by the beam position in A will be much larger than that found in B. This can be avoided by fanning the probe to the right (patient's left) in order to find the correct position. The diameter cannot be artificially enlarged, but can be made to appear smaller than it is



### III. Interpretation (\*much controversy remains)

\*Dependent on the clinical context. Should never be interpreted in isolation.

#### 1. As a predictor of CVP

- IVC CI > 50%
  - CVP likely < 10mmHg
- IVC maximum diameter may be combined with CI
  - IVCmax < 1.5cm makes high CVP much less likely
  - IVCmax > 2.5cm makes low CVP much less likely
- \*Take away message is that although there is a correlation between CVP and IVC measurements, it is not perfect. **It is most useful at extremes**

#### 2. As a predictor of CHF

- IVC CI  $\leq$  15% sens 93% and spec 84% for CHF Am J Emerg Med (2009) 27;71-75
- as IVC CI approaches 50%, CHF is less likely

#### 3. As a predictor of fluid responsiveness

- Best evidence for use is in ventilated patients
  - IVC DI  $\geq$  18% predicted fluid responsiveness sens 90%, spec 90% (Intensive Care Med 2004 30 (9))
- Seems to be less predictable in spontaneously breathing patients (Shock 2013 Vol 39 No 2)
  - IVC CI < 15% are less likely to respond NPV = 100%
  - IVC CI > 50% more likely to respond to fluids PPV = 75%

#### **\*Septic patients with IVC CI of 0% may still benefit from fluids**

4. Must be combined with both the available clinical info (history, physical, labs, other imaging) and other ultrasound exams. For example, when considering ADCHF, combine an IVC exam with a lung scan for B lines and pleural effusions and a cardiac exam to assess gross LV function.