Point-of-care echocardiography

ESTIMATING PULMONARY ARTERY SYSTOLIC PRESSURE (PASP)

Elevated pulmonary artery pressure results from pulmonary arterial hypertension, thromboembolic disease, left-heart disease, or lung disease.

We can measure the pulmonary artery systolic pressure (PASP) with echo, and use this as an estimate of the mean pulmonary artery pressure. This information allows us to understand hemodynamics in the critically ill and evaluate patients with dyspnea.

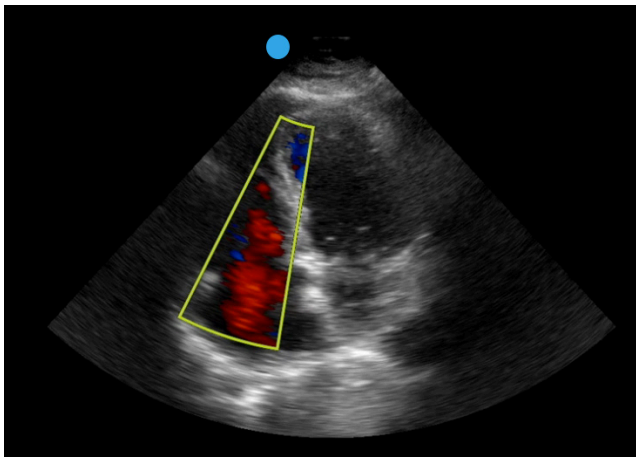
Calculating PASP

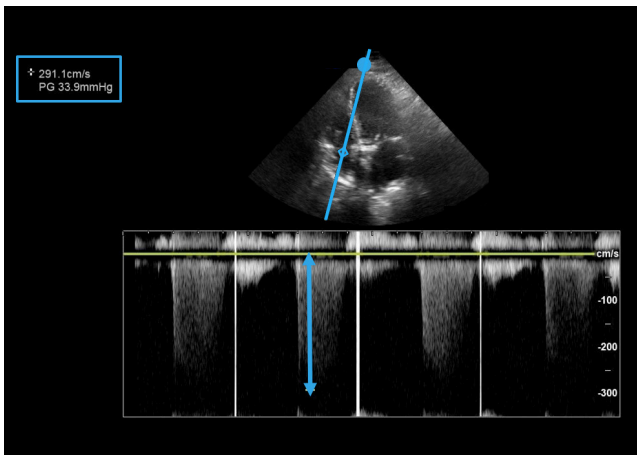
To measure the PASP, we need to determine the pressure gradient across the triscuspid valve.
We use the modified Bernoulli equation:

$$P_{PASP} = 4 \times V_{TR}^{2} + P_{RA}$$

V_{TR} = velocity of tricuspid regurgitation P_{RA} = right atrial pressure

To measure V_{TR}, identify the tricuspid regurgitation jet with color Doppler, then apply continuous wave Doppler to measure its peak velocity.





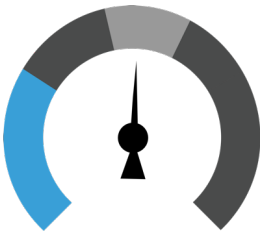
Then measure inferior vena cava (IVC) size and collapsibility with M mode to obtain an estimate for P_{RA}.

Inferior vena cava (IVC) size (cm)	% Collapse	Estimated right atrial pressure (RAP)
< 1.5	< 1.5	0–5
1.5–2.5	> 50	5–10
1.5–2.5	> 50	10–15
> 2.5	> 50	15–20

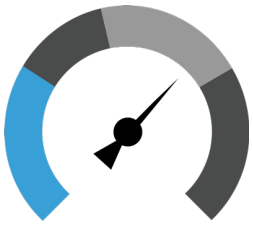
The values for V_{TR} and P_{RA} can now be substituted in to the Bernoulli equation.

The result indicates whether elevated pulmonary artery pressure is present.

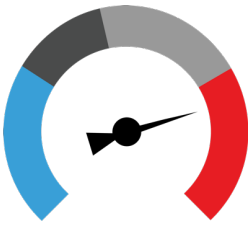
Normal
< 25 mm Hg



Mild
> 40–50 mm Hg



Moderate
> 50 mm Hg



Severe
> 60 mm Hg