

Tip Positioning Using Doppler

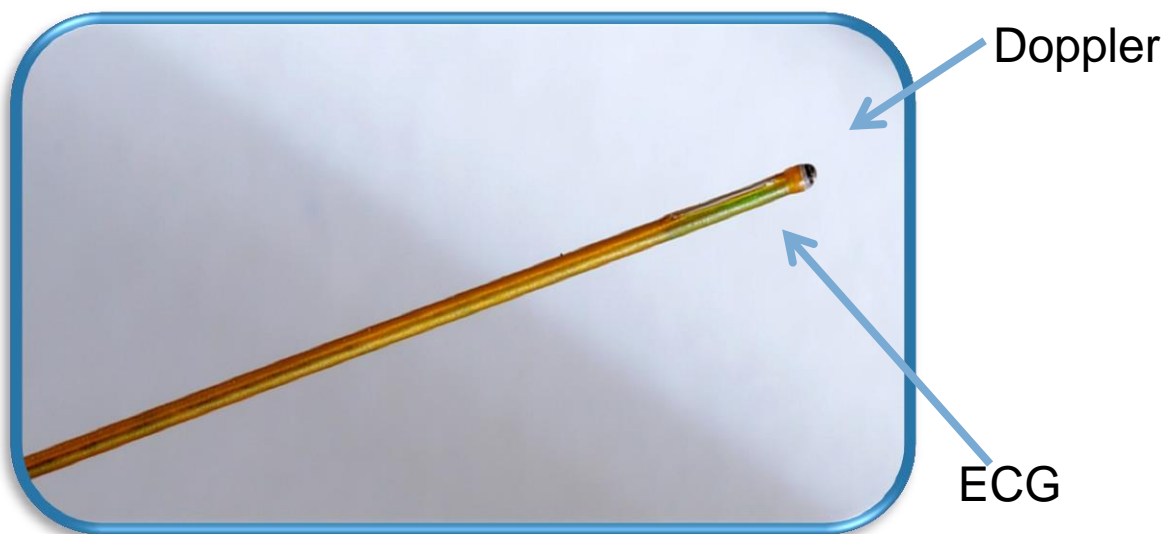
ARROW[®] VPS G4[™] Device

Objectives

- The clinician will:
 - Understand Doppler signatures when using the ARROW® VPS G4™ Device
 - Describe antegrade and retrograde blood flow
 - Describe blood flow when using the ARROW® VPS G4™ Device and correlate to symbols displayed on the console monitor

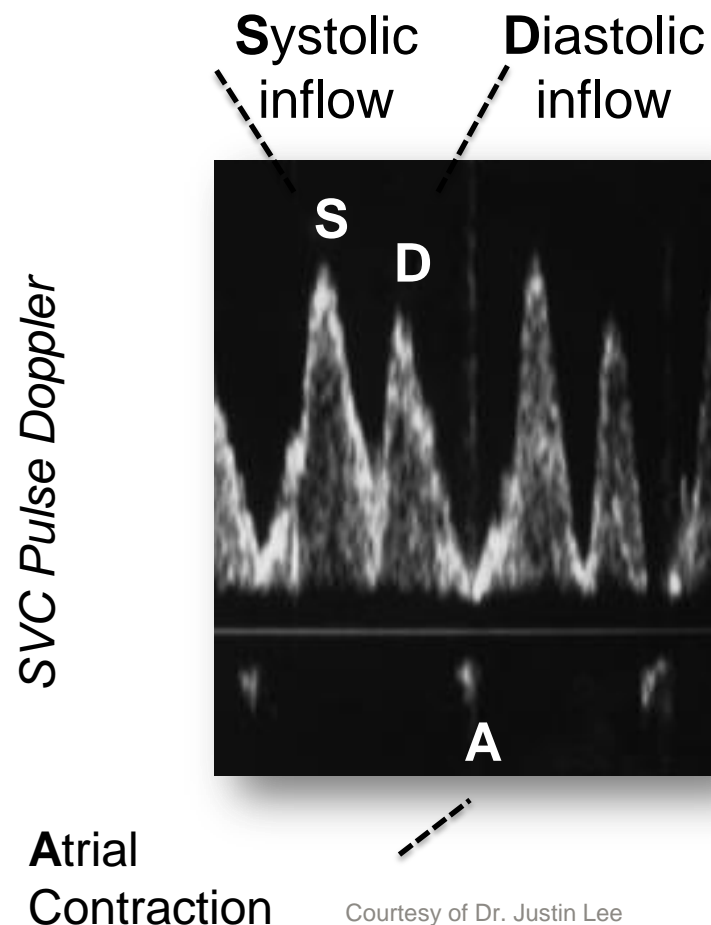
ARROW® VPS® Stylet Biosensor

- Doppler is able to detect blood flow direction
- ECG monitors heart waveforms
- Readings are intravascular instead of extravascular



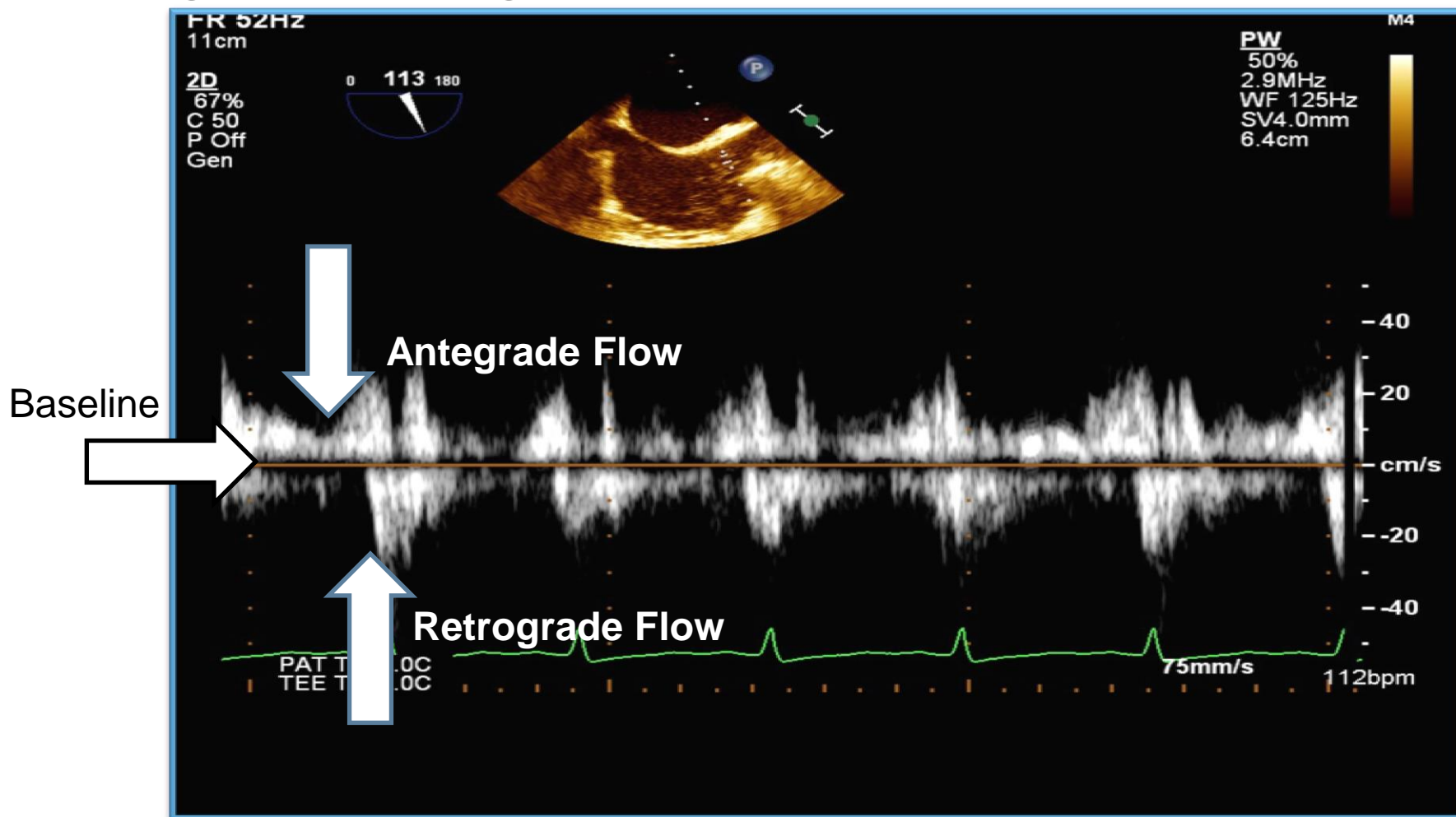
Doppler Principles for Tip Positioning

Flow in veins is pulsatile, driven by heart cycle hemodynamics



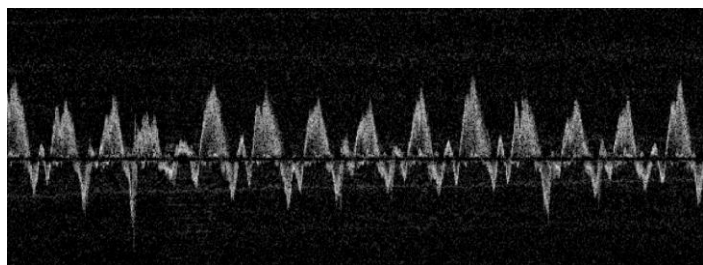
Tip Positioning with Doppler

- Antegrade and Retrograde

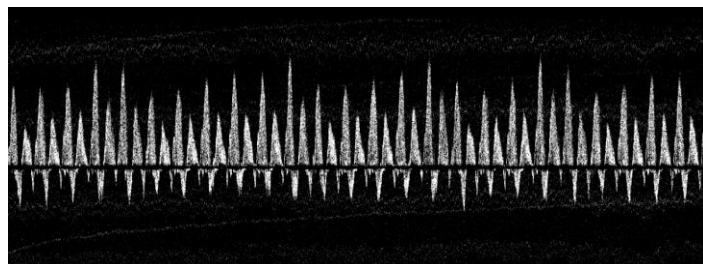


Courtesy of Dr. Justin Lee

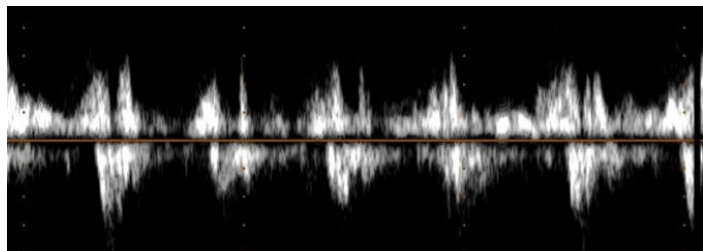
Doppler Flow Signatures



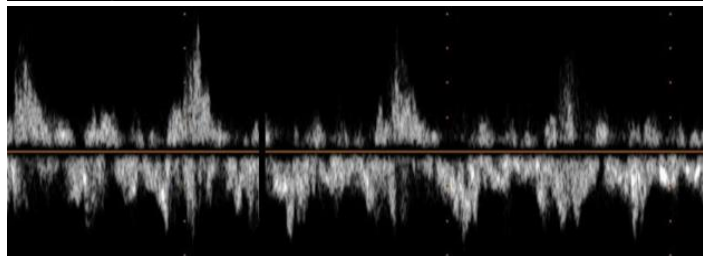
Proximal
Mid SVC



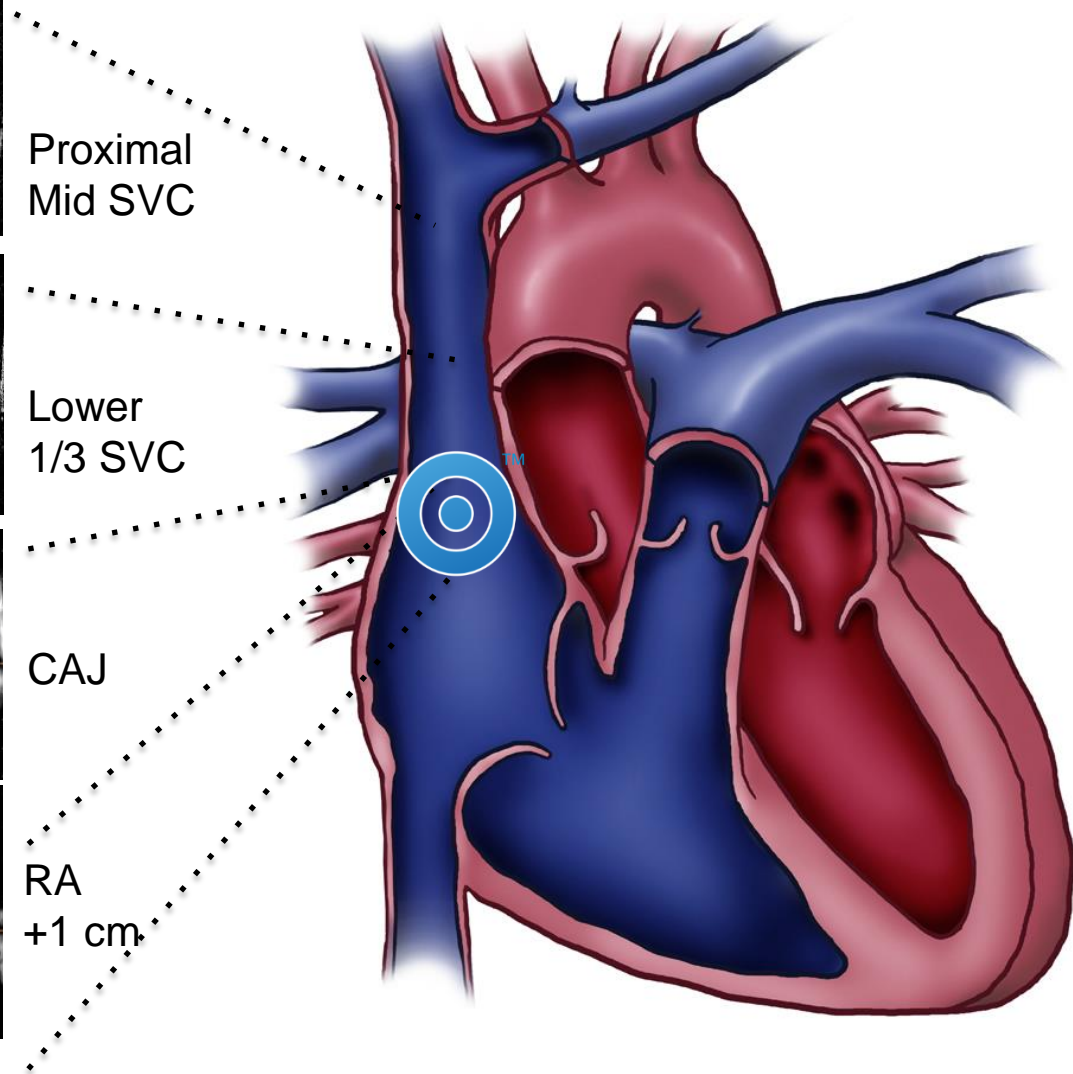
Lower
1/3 SVC



CAJ



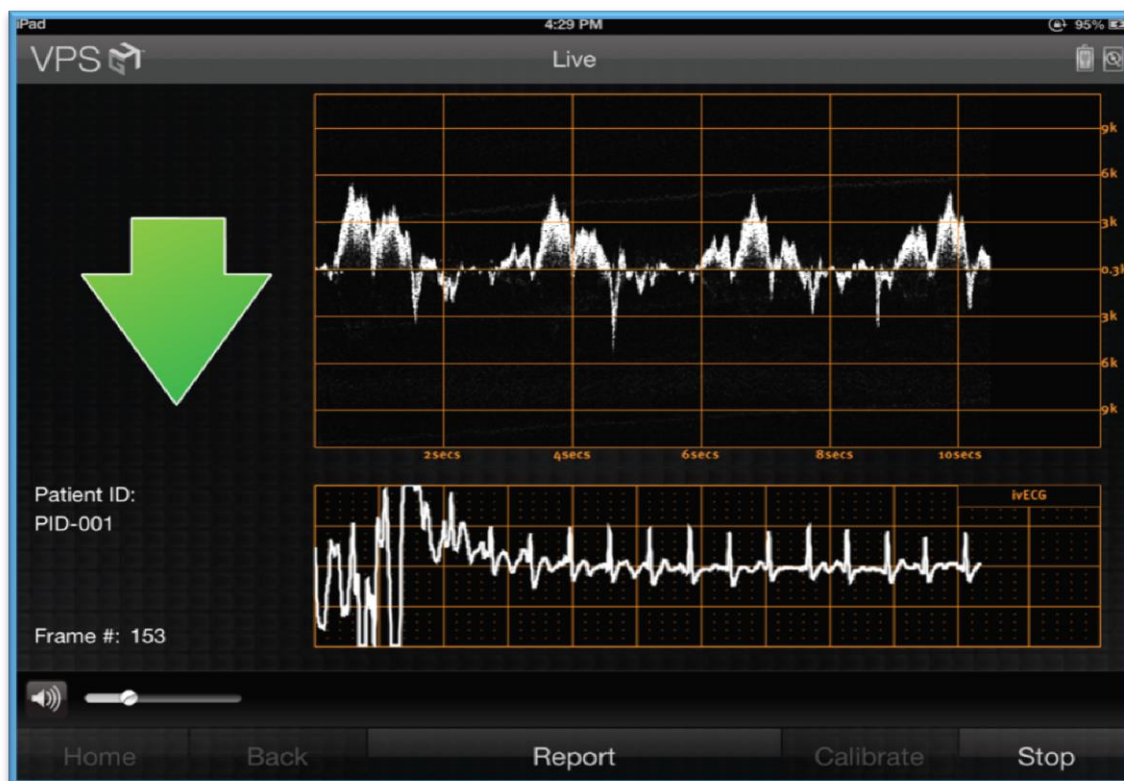
RA
+1 cm



Tip Positioning with the ARROW® VPS G4™ Device

Green Arrow = Keep going

- The catheter/VPS® Stylet assembly is moving with the flow of the blood towards the heart (antegrade flow)



Tip Positioning with the ARROW® VPS G4™ Device

Orange Circle = Wrong way, retract catheter

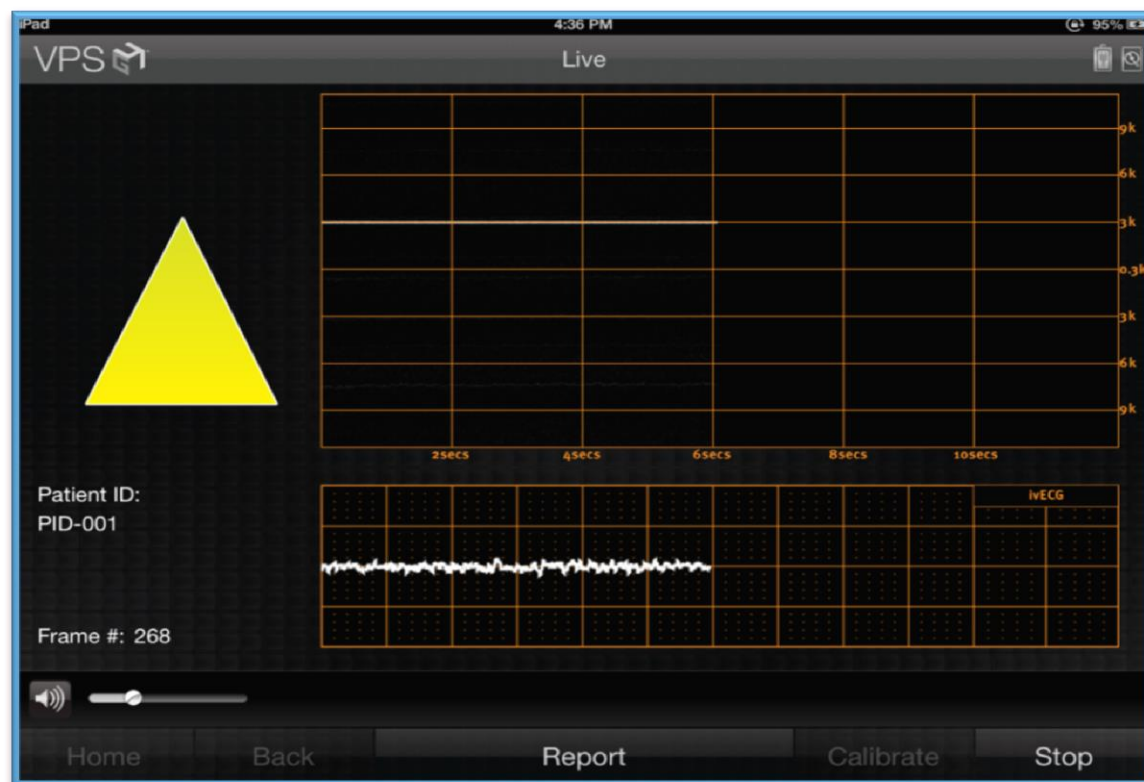
- The catheter/VPS® Stylet assembly is moving against the flow (retrograde) and could be advancing:
 - Into the jugular
 - Into the azygous vein
 - Into an artery
 - Laterally across chest
 - Beyond the target



Tip Positioning with the ARROW® VPS G4™ Device

Yellow Triangle = Damped Doppler signal

- Tip is possibly against vessel wall, or retracted inside the catheter
- Clinician should:
 - Check markings
 - Flush catheter
 - Reposition



Tip Positioning with the ARROW® VPS G4™ Device

Steady Blue Bullseye = Correct placement

- You have reached the lower 1/3 of the SVC-CAJ
- Position the tip in the upper edge of the Blue Bullseye zone and wait for the REPORT button to turn blue (this is a steady Blue Bullseye)
- When the REPORT button is blue press the button to generate a tip confirmation statement as a PDF document for your records



Common Signatures with the ARROW® VPS G4™ Device

Confluence signature

- Veins joining together, for example, the subclavian and IJ
- Note antegrade flow, alternating with retrograde flow
- Thread slowly to allow blood flow to carry PICC



Common Signatures with the ARROW® VPS G4™ Device

Right atrium signature

- P-wave spike
- Retrograde flow
- Catheter fully inserted



Common Signatures when using ARROW® VPS G4™ Device

Atrial Fibrillation

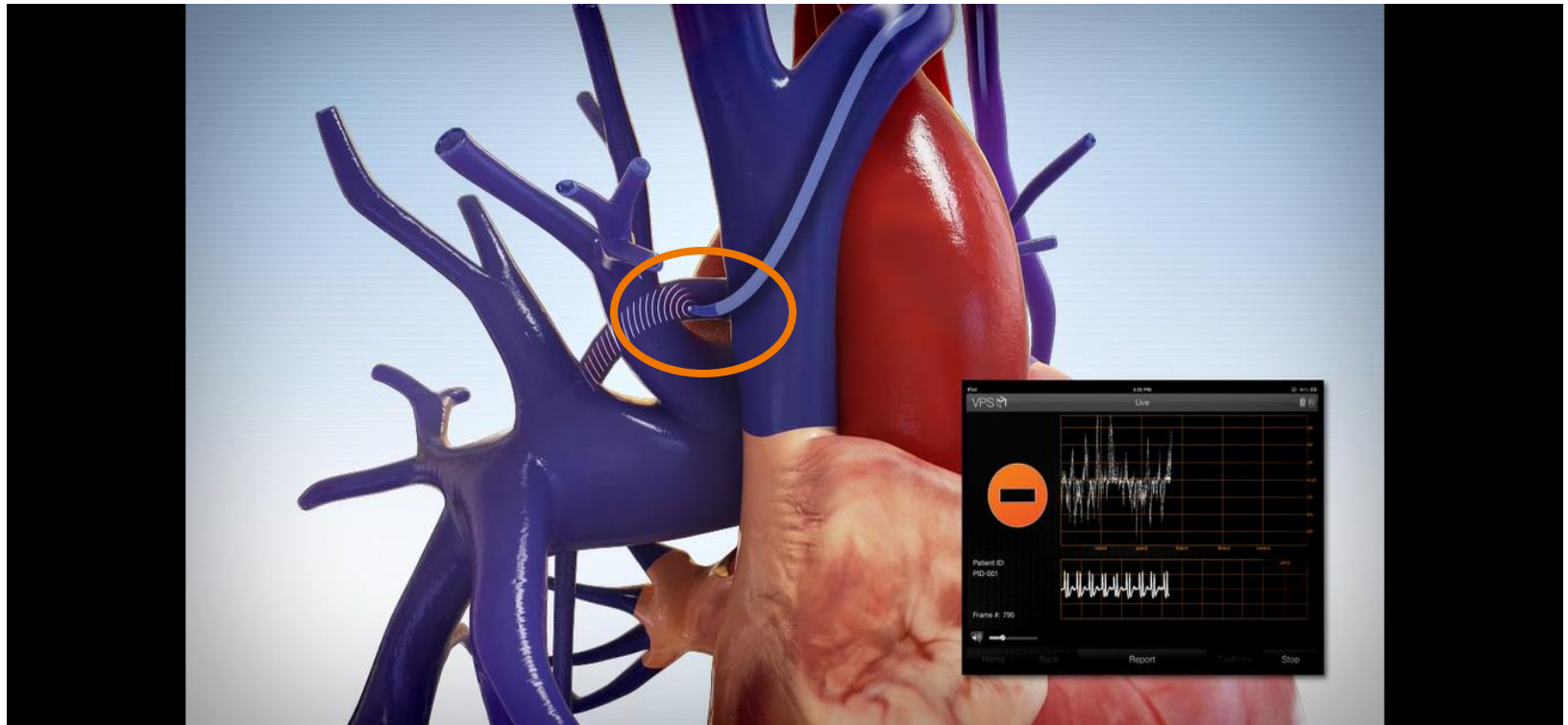
- Peaked Doppler flow
- In SVC
- Catheter fully inserted
- Chatter



Common Signatures with the ARROW® VPS G4™ Device

Azygous placement

- Doppler damped
- P-wave spike
- Catheter fully inserted



Tip Positioning with ARROW® VPS G4™ Device

Catheter trimmed too short

- P-wave spike
- Good flow
- Unable to obtain BBE



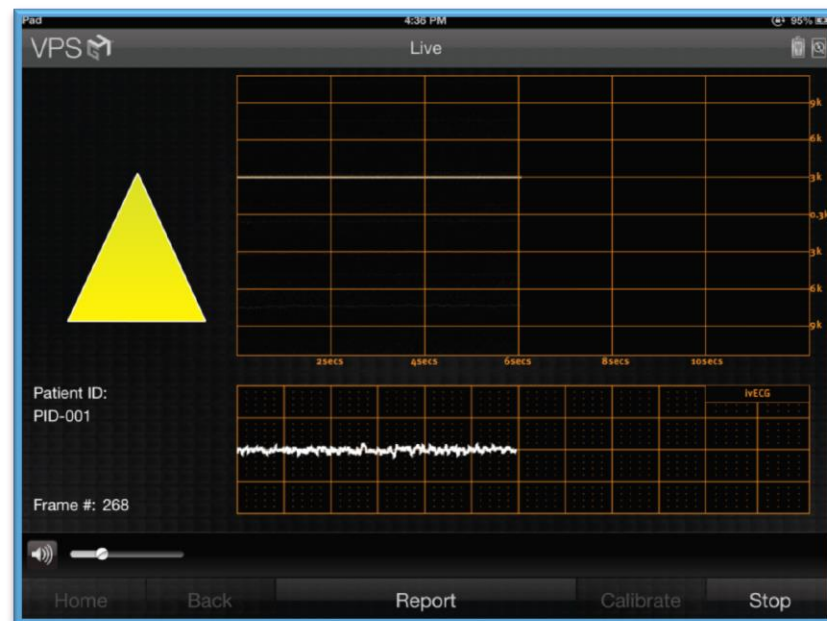
Tip Positioning with ARROW® VPS G4™ Device

Catheter looped back from SVC to Axilla (correlated with fluoroscopy)

- Damped Doppler after a good flow
- Flush catheter and reposition



- VPS® Stylet will retract into catheter
- Check placement of mark on VPS® Stylet
- Perform flush test



Tip Positioning with the ARROW® VPS G4™ Device

Threading past the IJ

- Insert the PICC slowly, optimizing flow from the IJ
- If you obtain an orange circle symbol, pull catheter back until you obtain green arrow symbol, continue to thread slowly
- Refer to clinical best practice and troubleshooting to thread past IJ

