



# Tip Positioning Using Doppler

ARROW® VPS G4™ Device

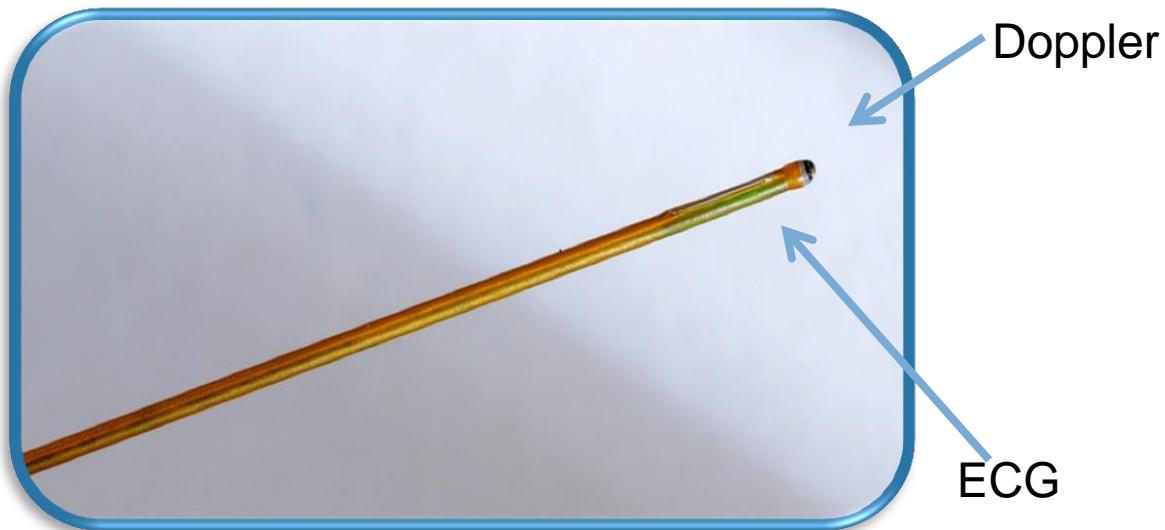
## Objectives

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- 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

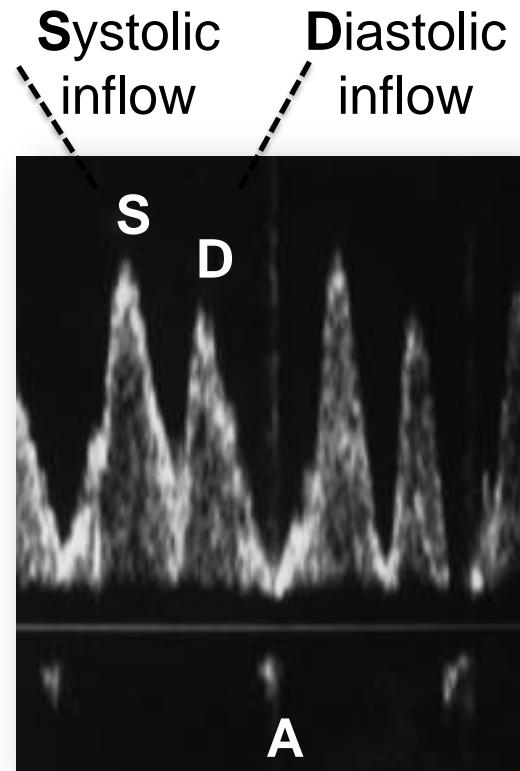


# Doppler Principles for Tip Positioning

Flow in veins is pulsatile, driven by heart cycle hemodynamics

SVC Pulse Doppler

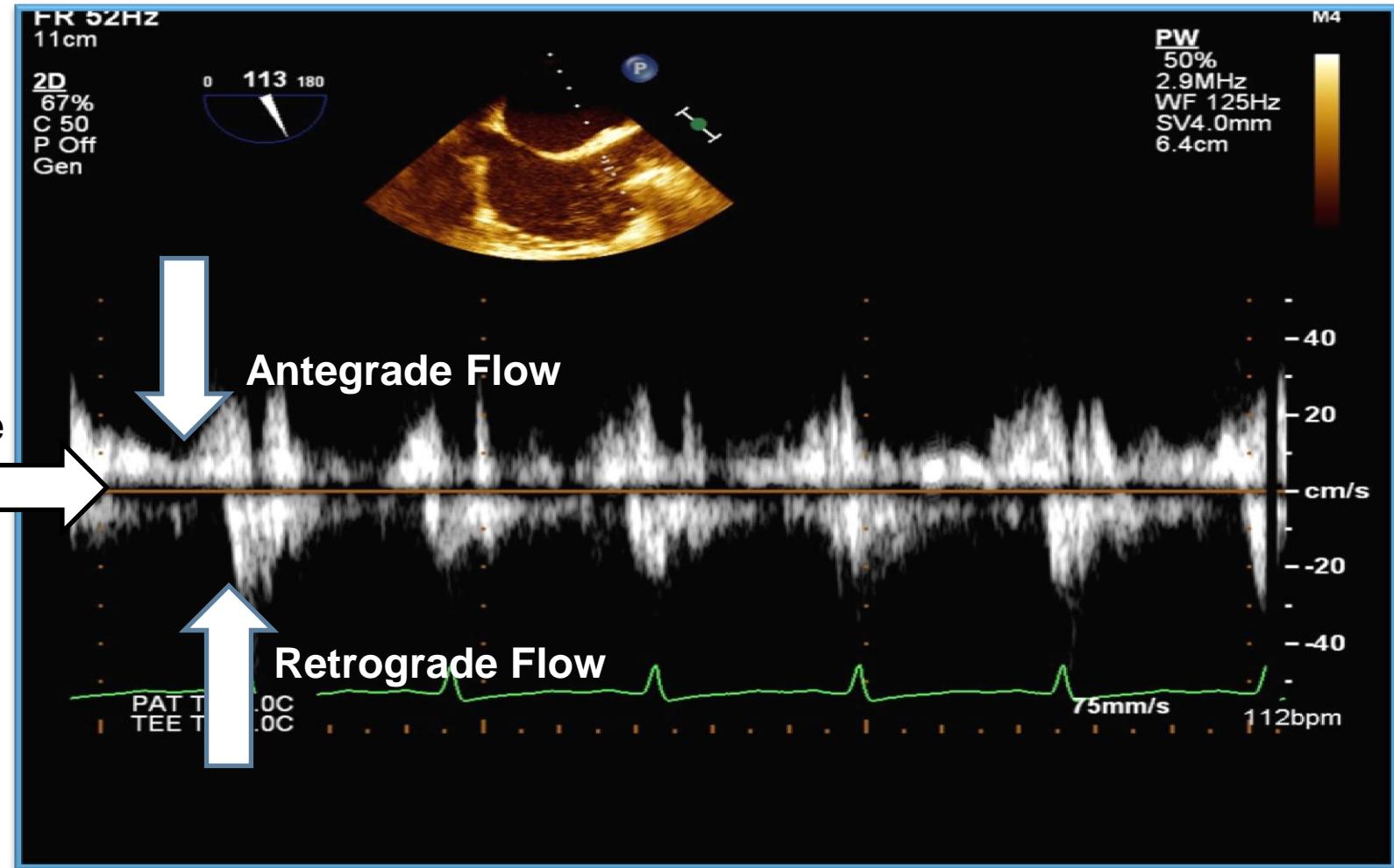
Atrial  
Contraction



Courtesy of Dr. Justin Lee

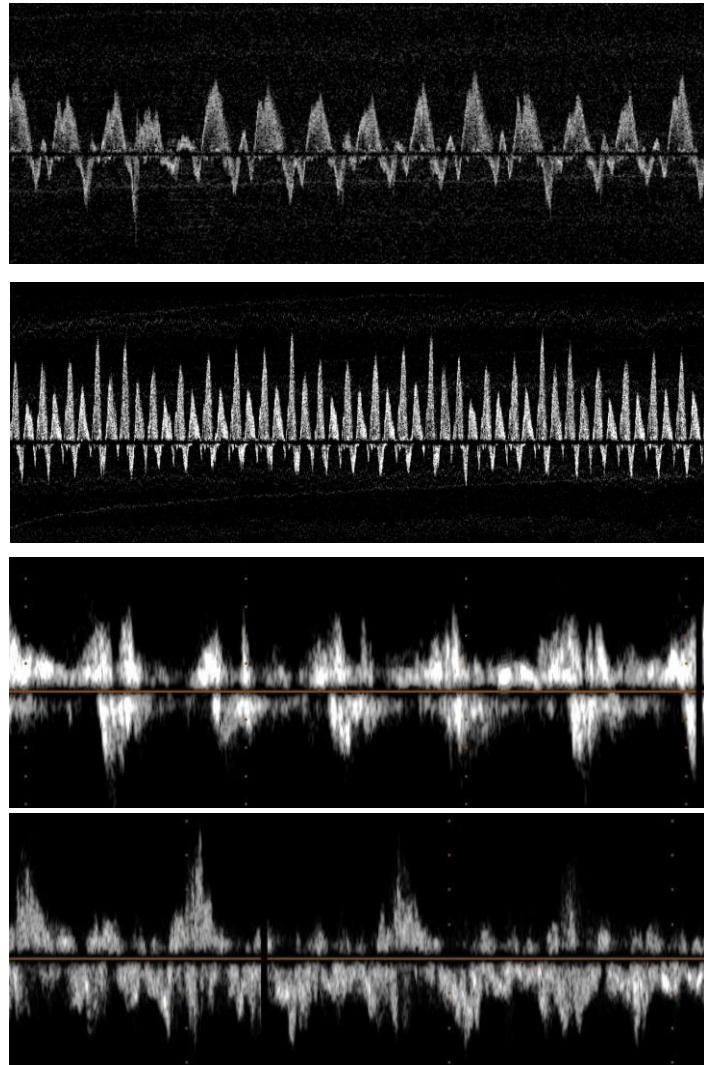
## Tip Positioning with Doppler

- Antegrade and Retrograde



Courtesy of Dr. Justin Lee

# Doppler Flow Signatures

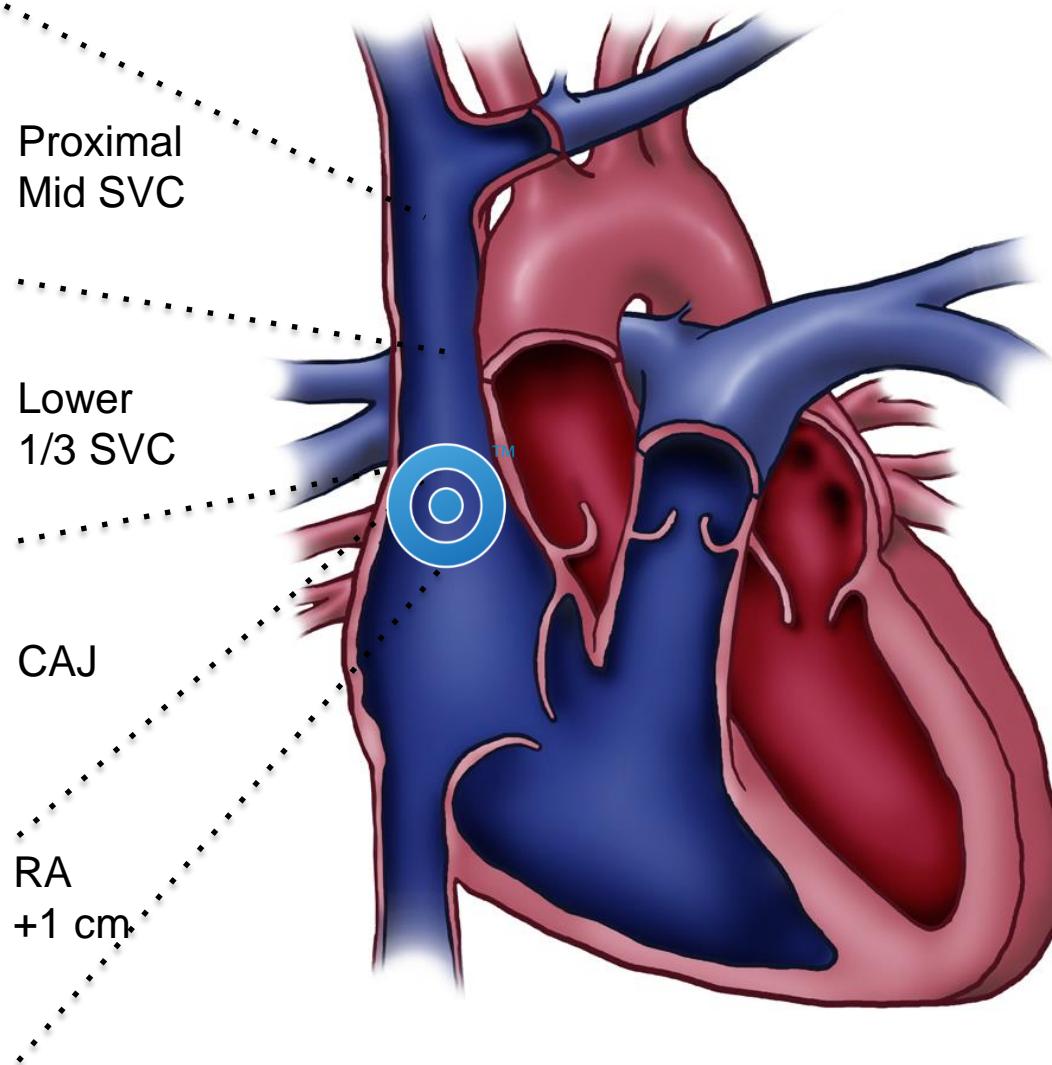


Proximal  
Mid SVC

Lower  
1/3 SVC

CAJ

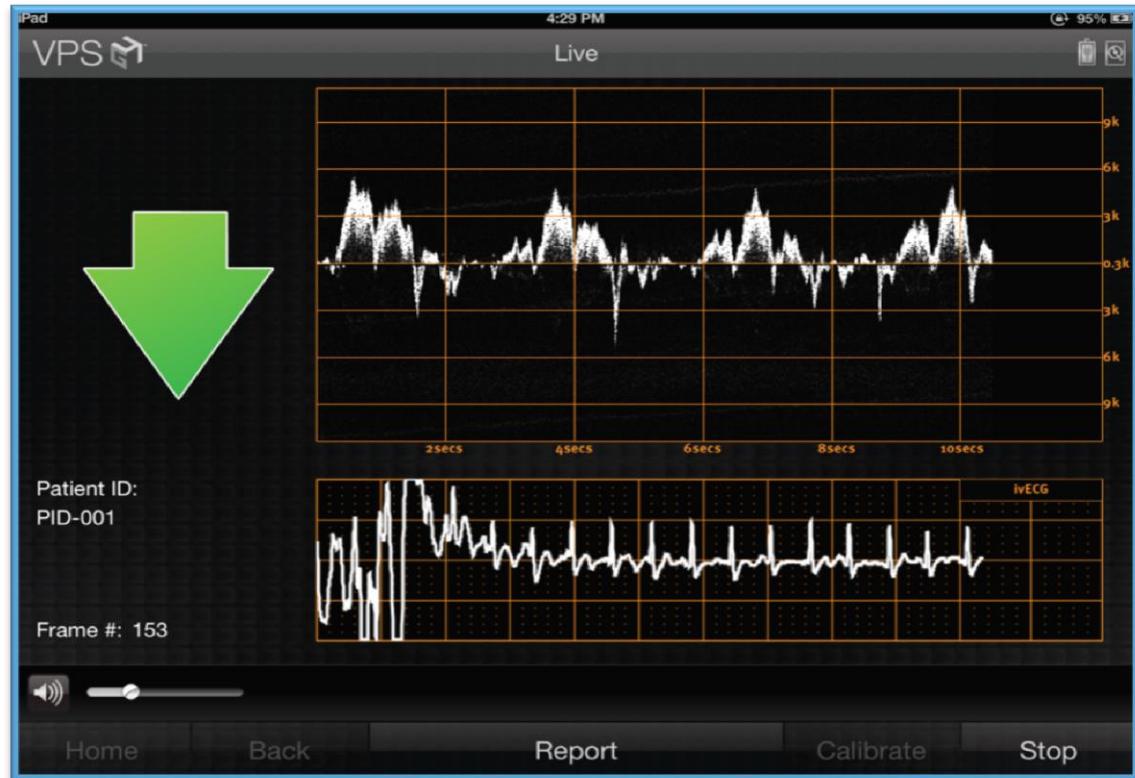
RA  
+1 cm



# 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

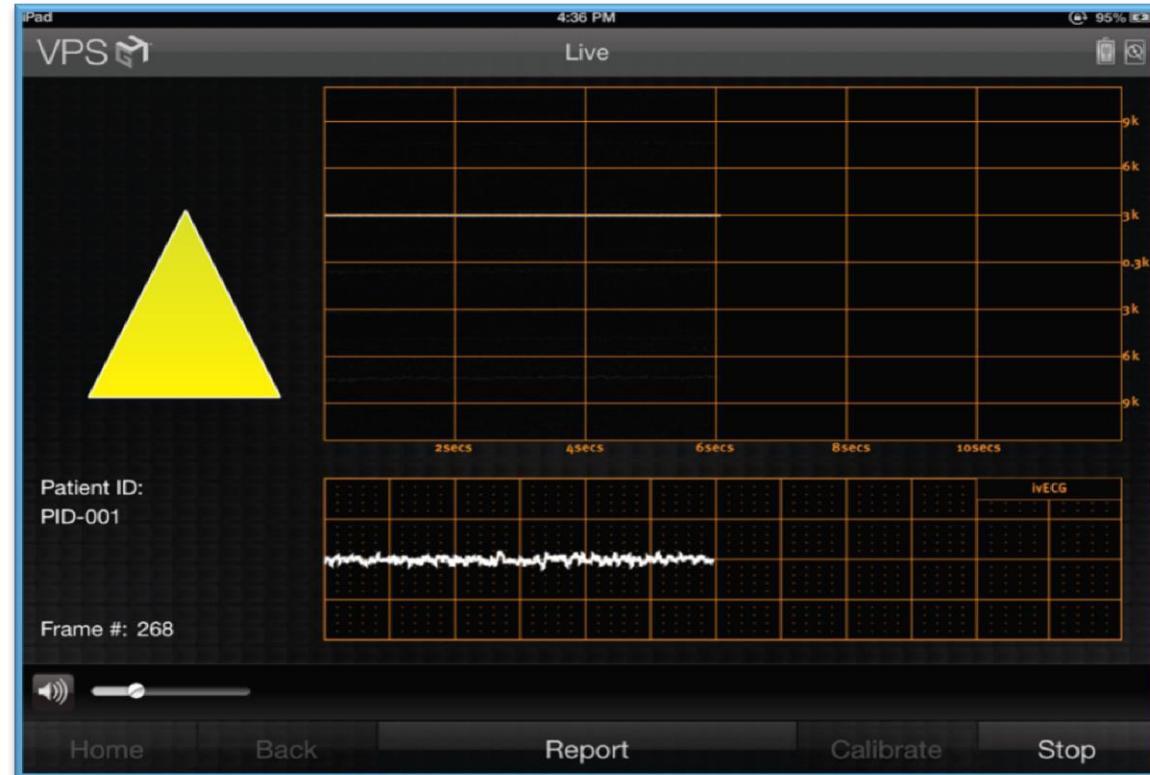
- The catheter/VPS® Stylet assembly is moving against the flow (retrograde) and could be advancing:
  - Into the jugular
  - Into the azygous vein
  - Into an artery
  - Laterally across chest
  - Beyond the target



# Tip Positioning with the ARROW® VPS G4™ Device

Yellow Triangle = Damped Doppler signal

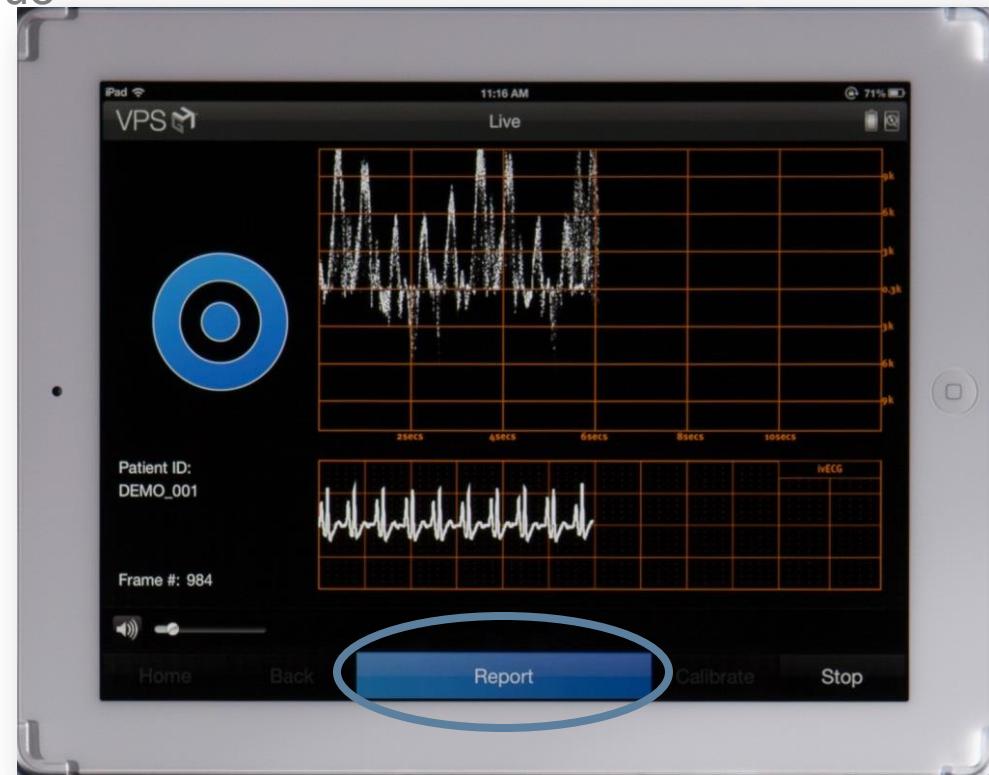
- Tip is possibly against vessel wall, or retracted inside the catheter
- Clinician should:
  - Check markings
  - Flush catheter
  - Reposition



# 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



## 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



## Right atrium signature

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



# Common Signatures when using ARROW® VPS G4™ Device

ARROW®  
NEVER SETTLE™

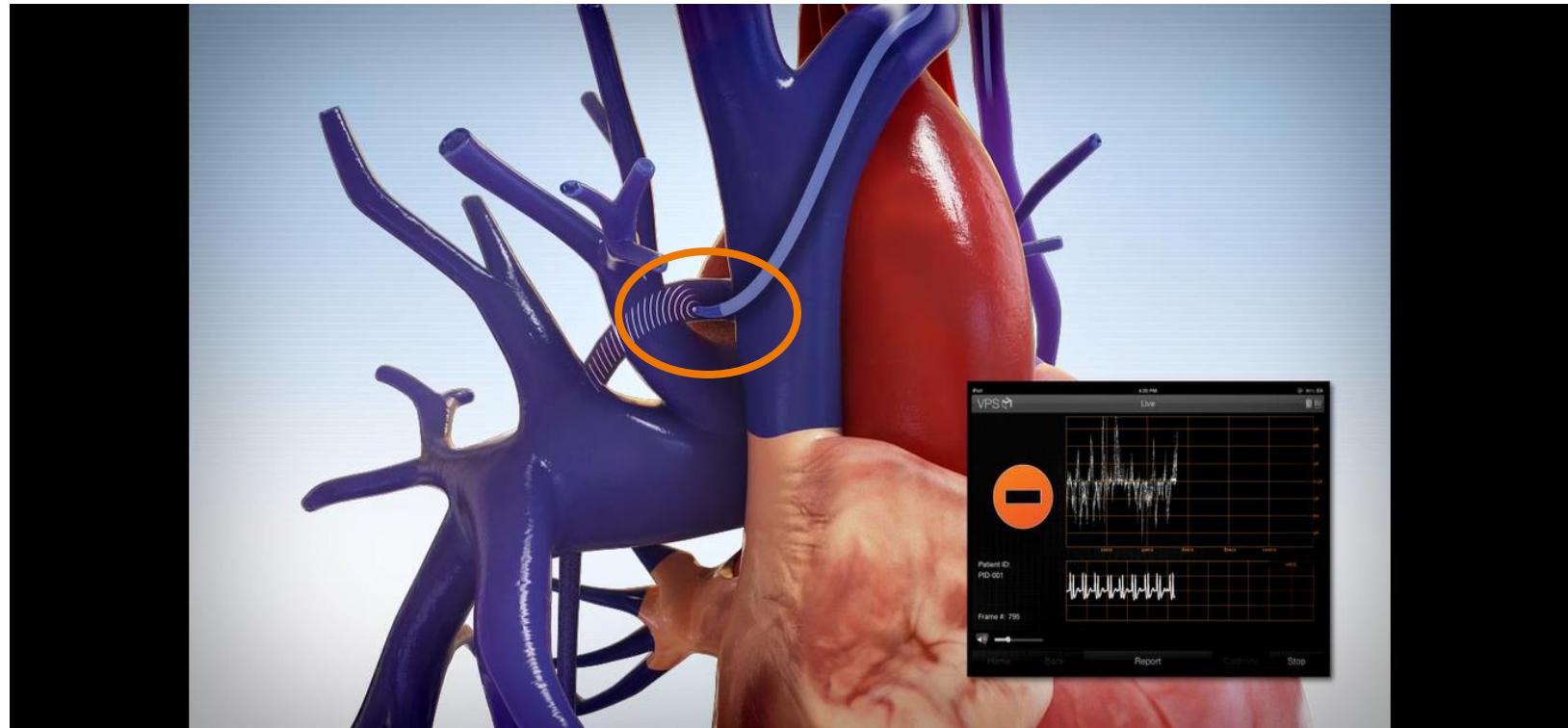
## Atrial Fibrillation

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



## 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)

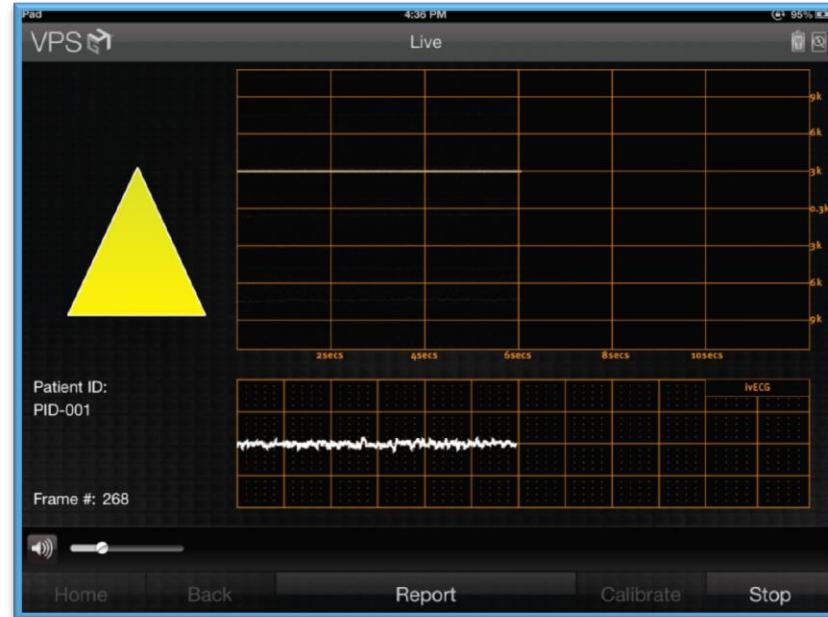
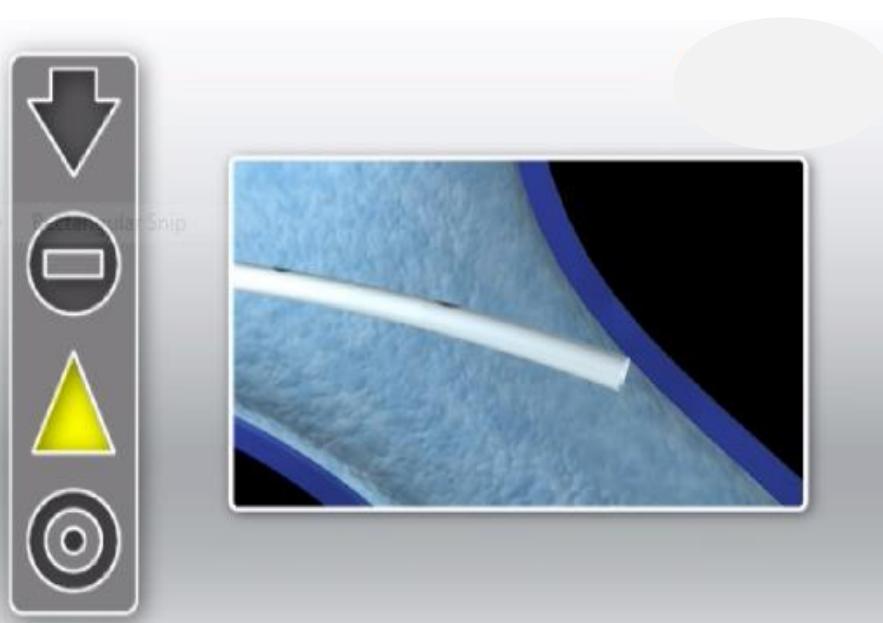
- Damped Doppler after a good flow
- Flush catheter and reposition



# Tip Positioning with the ARROW® VPS G4™ Device

Catheter is positioned against the wall

- 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

