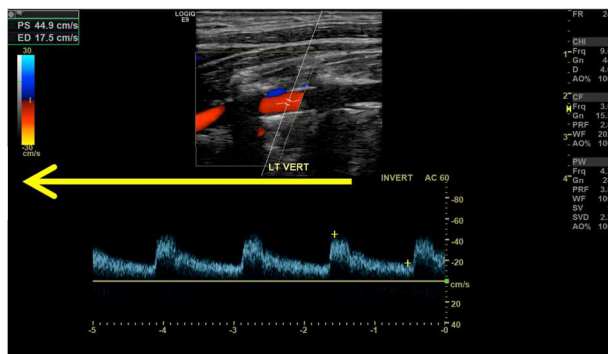


Subclavian and Vertebral Arterial Duplex

Case Presentation

Yongsheng Li, RVT
Non-invasive Diagnostic Vascular Laboratory
Massachusetts General Hospital

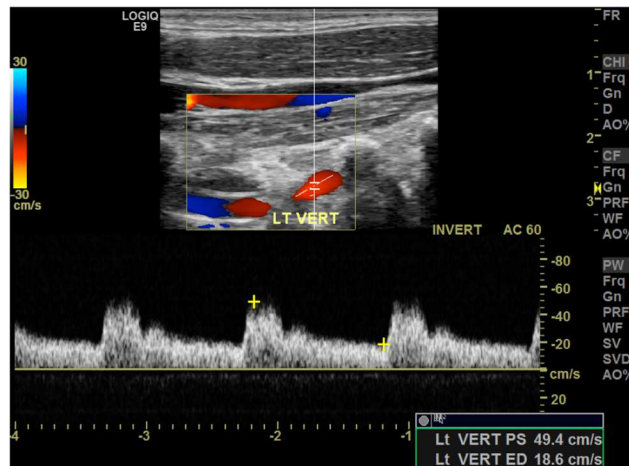
Normal Vertebral Artery Flow



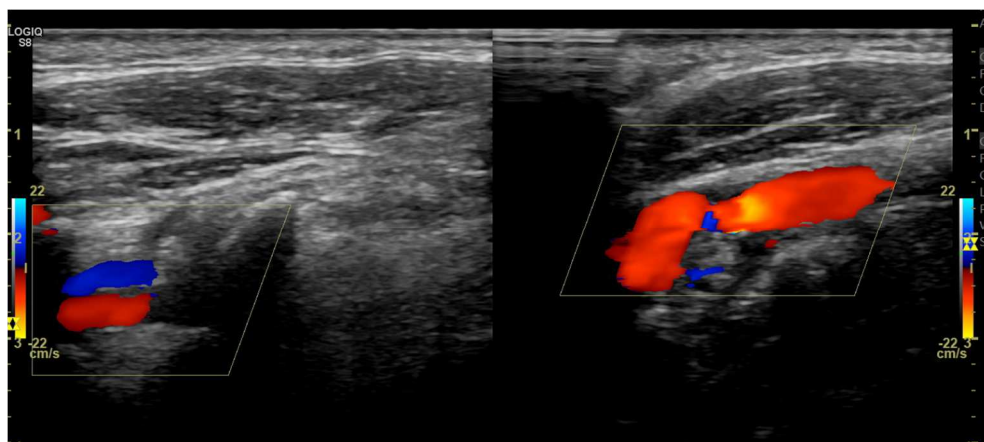
- Laminar flow
- Narrow envelope of velocities
- Brisk upstroke
- Broad systolic peaks
- A large amount of flow throughout the diastole
- Normal peak systolic velocity (PSV): 20–60 cm/sec

Left side towards head

Spectral Broadening Flow Waveforms in Normal Vertebral Artery



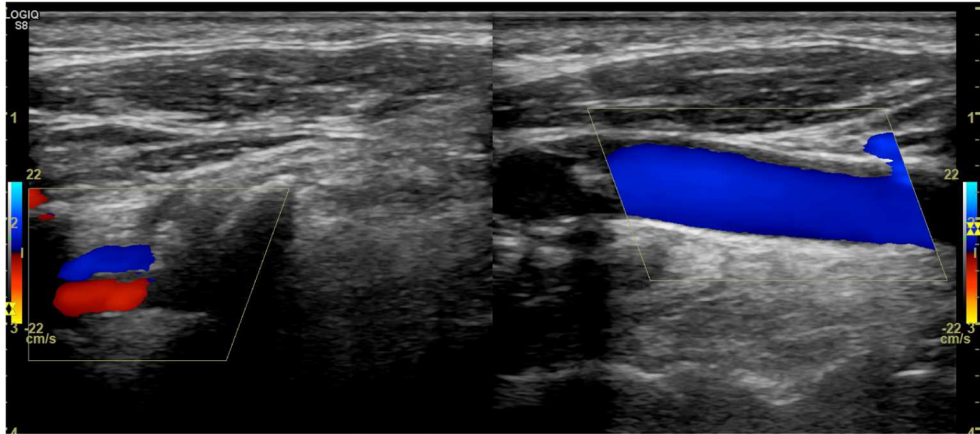
Flow Direction in Vertebral Artery



Vertebral Artery / Vein

CCA

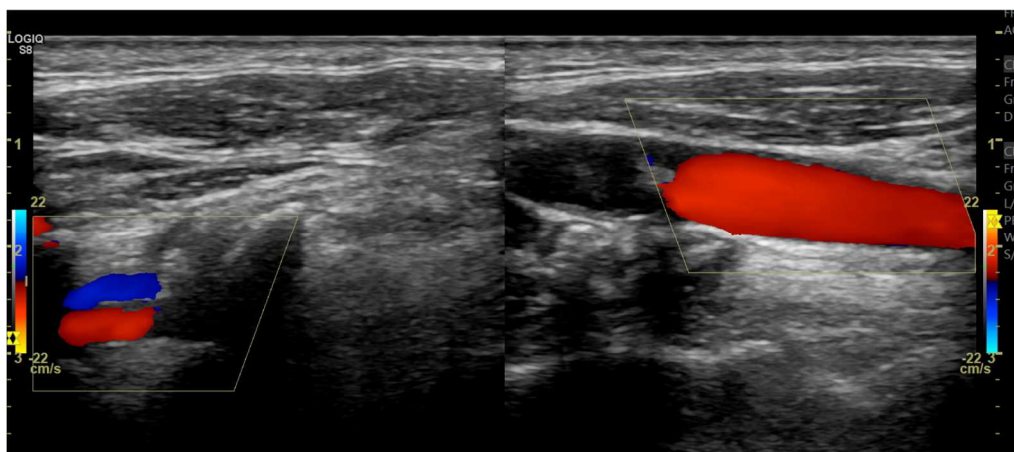
Flow Direction in Vertebral Artery



Vertebral Artery / Vein

CCA

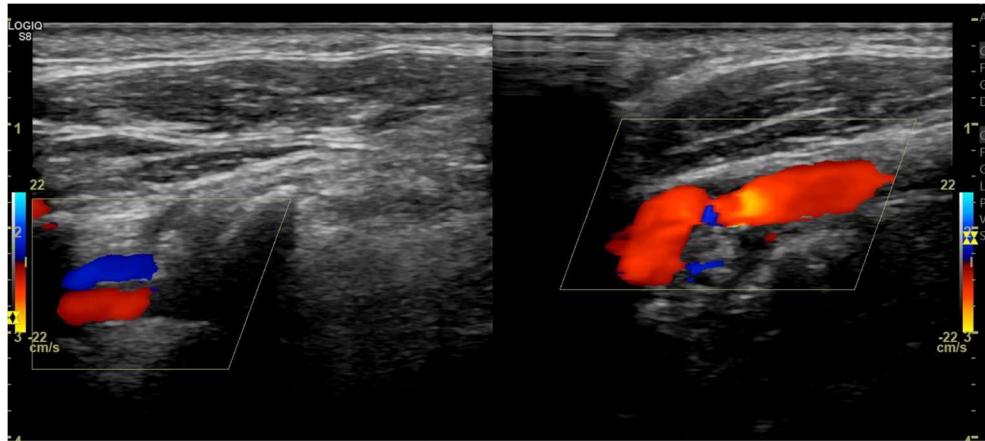
Flow Direction in Vertebral Artery



Vertebral Artery / Vein

CCA

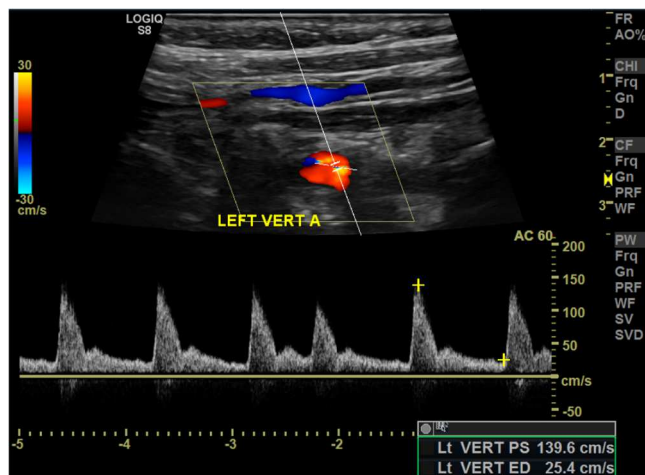
Flow Direction in Vertebral Artery



Vertebral Artery / Vein

CCA

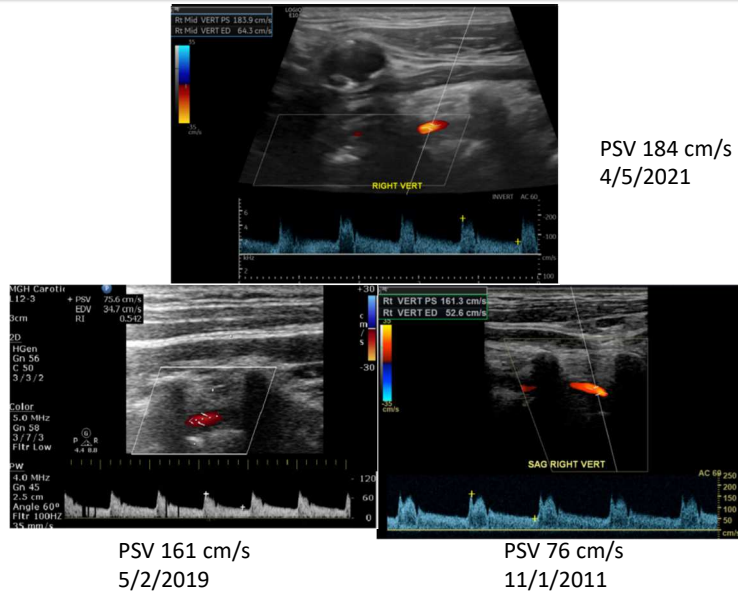
Vertebral Artery Stenosis



PSV > 100 cm/sec

Lt VERT PS 139.6 cm/s
Lt VERT ED 25.4 cm/s

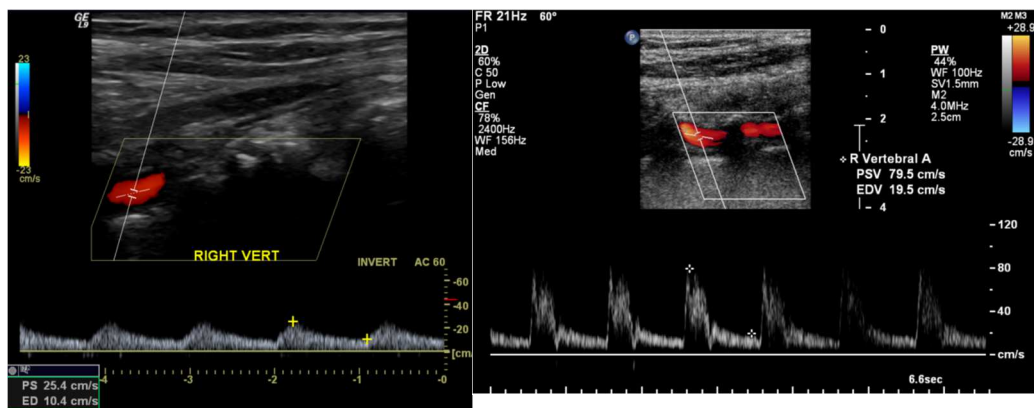
Vertebral Artery Stenosis



PSV 161 cm/s
5/2/2019

PSV 76 cm/s
11/1/2011

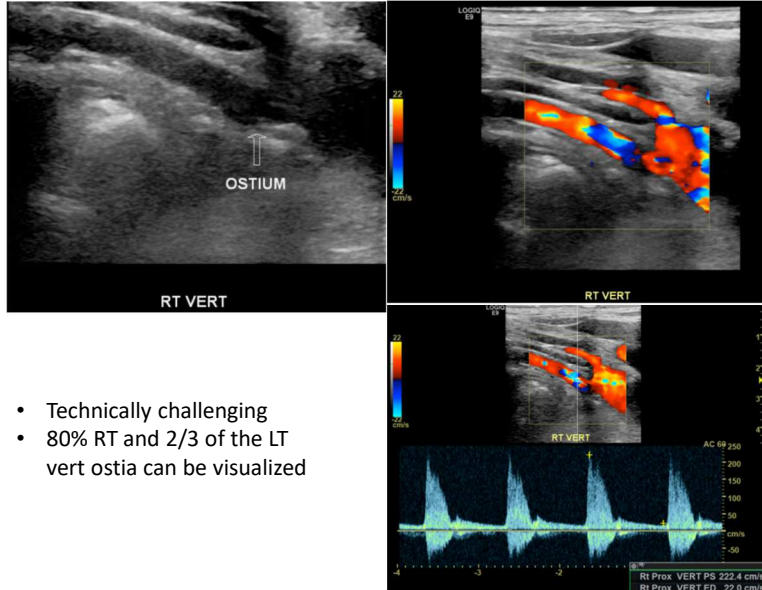
Vertebral Artery Ostium Stenosis



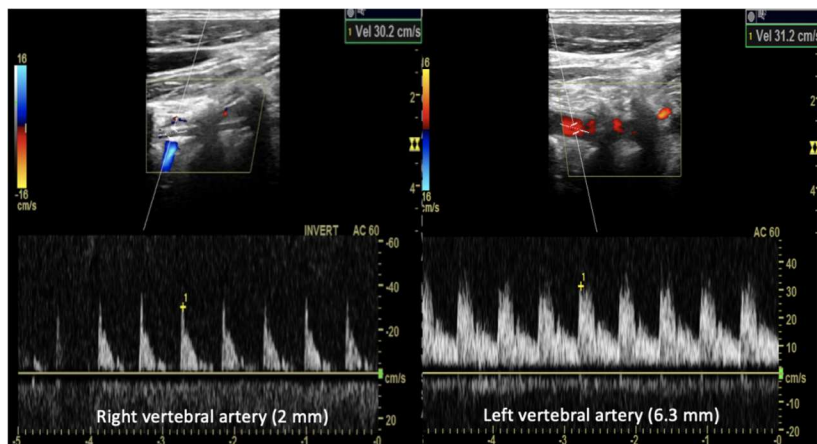
Tardus parvus flow waveforms

Post stenting:
Normal flow spectrum and velocity

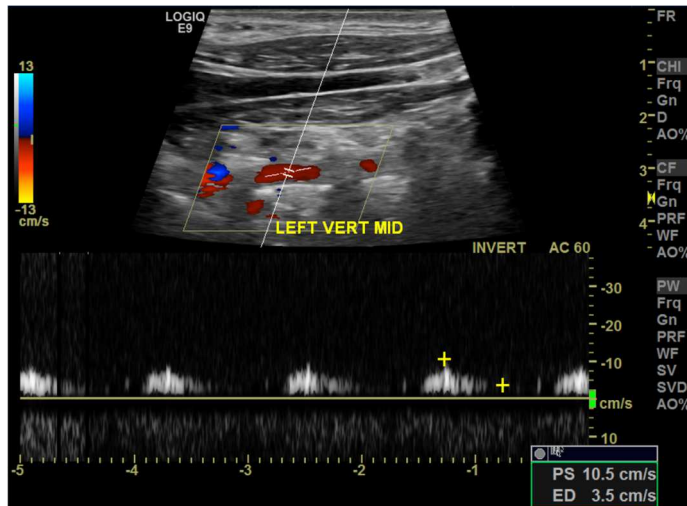
Vertebral Artery Ostium Stenosis – CTA confirmed



Distal Segment Vertebral Artery Stenosis

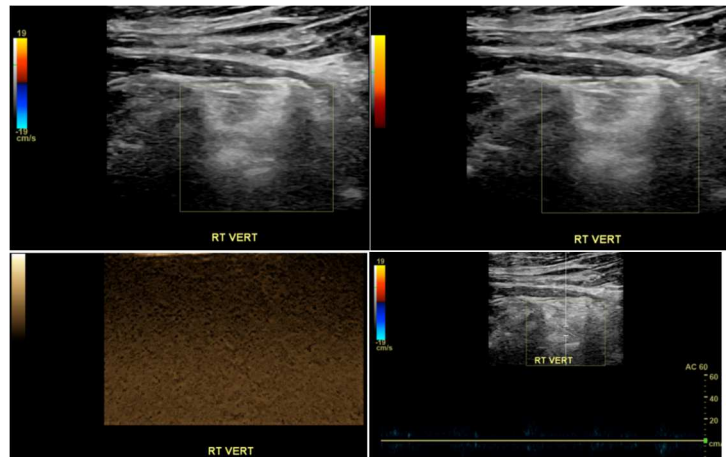


Vertebral Artery Ostium Stenosis



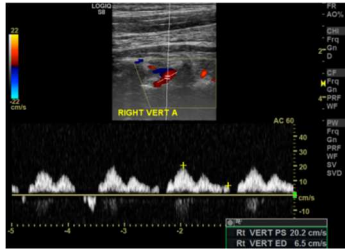
CTA: Critical stenosis at ostium of LT vert A

Vertebral Artery Occlusion on CTA

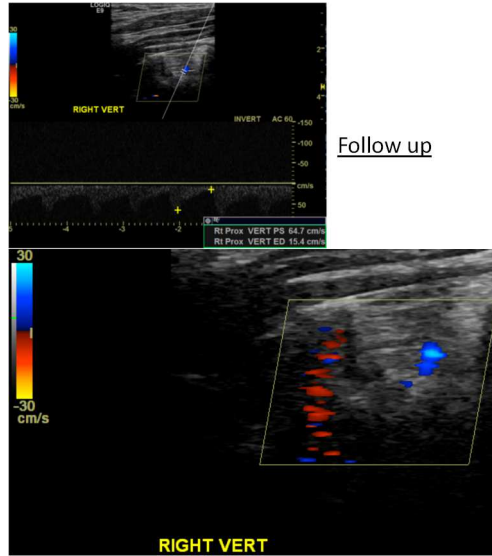


Vertebral Artery Occlusion on CTA

Prior study

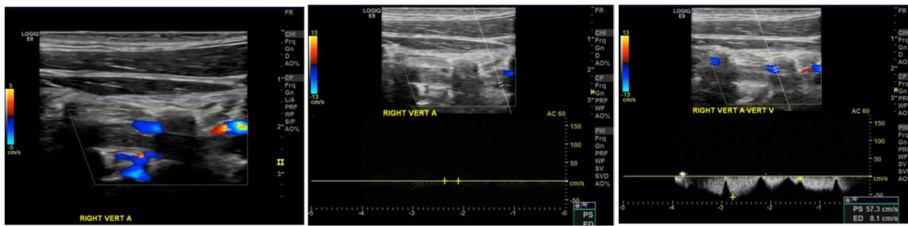


Follow up

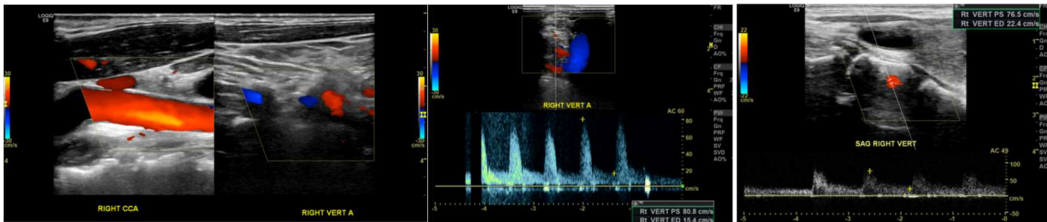


Vertebral Artery Occlusion – CTA confirmed

Study 1



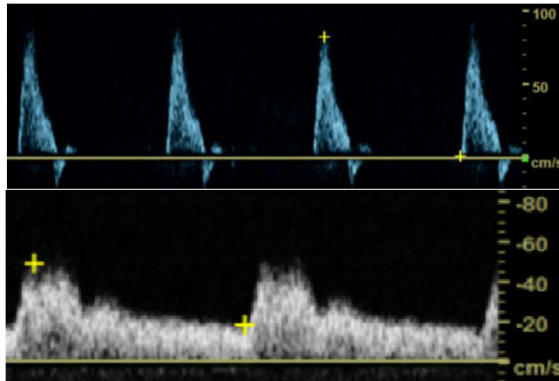
Study 2



Study 3

Doppler Spectral Waveform

HIGH RESISTANCE

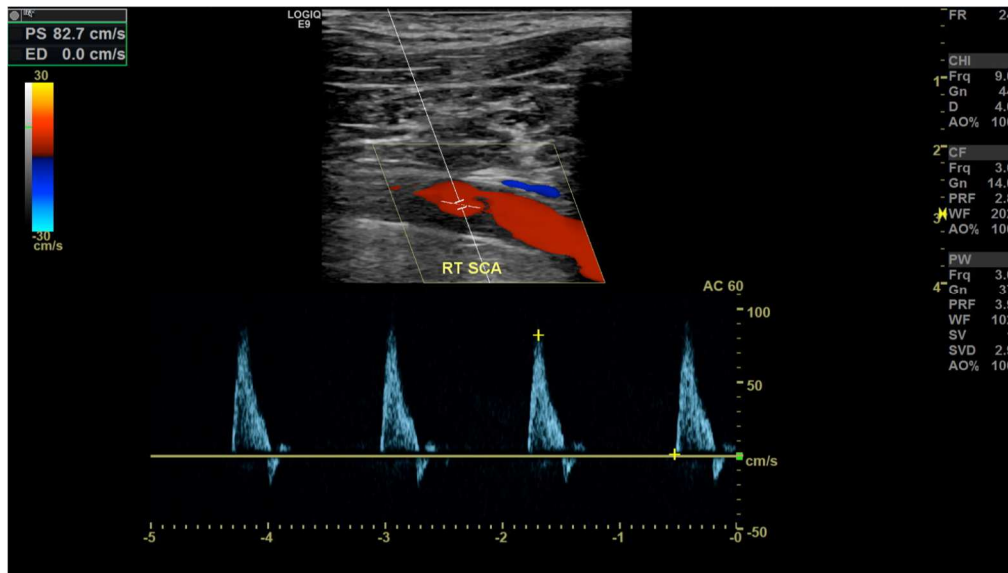


Diastolic flow

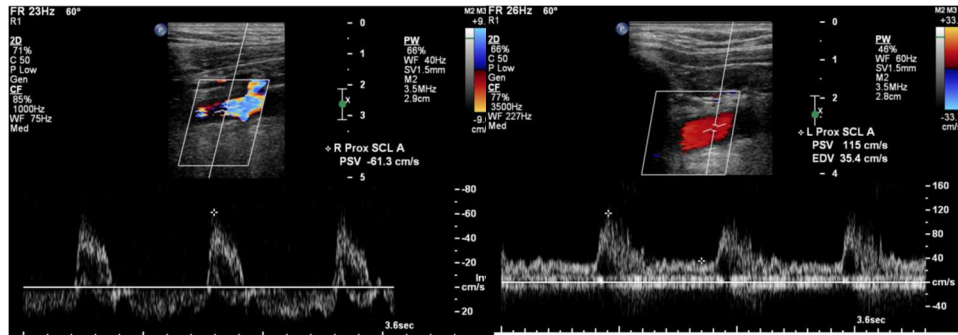
- Resistance to flow
- Demand of distal bed

LOW RESISTANCE

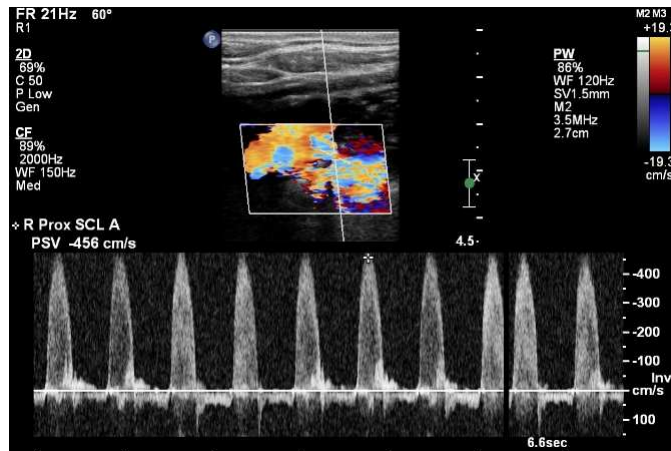
Normal Subclavian Artery Flow



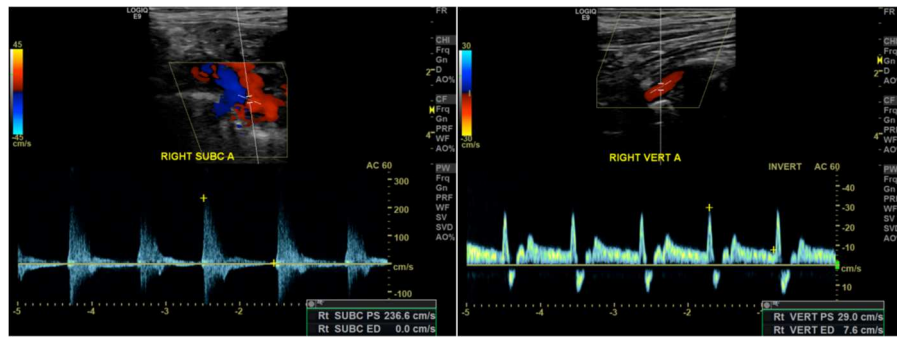
Subclavian Artery Flow Waveforms



Proximal Subclavian Stenosis

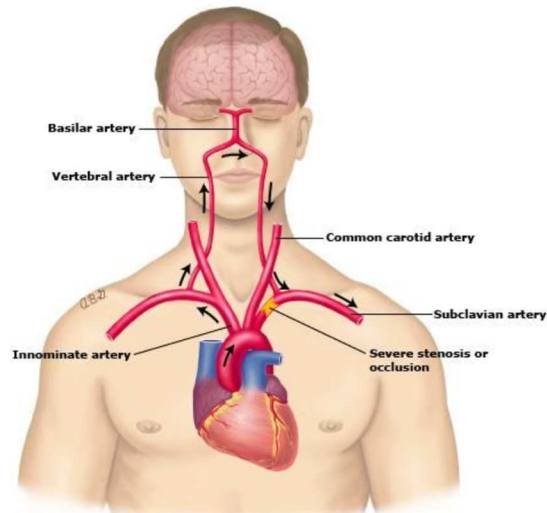


Proximal Subclavian Stenosis



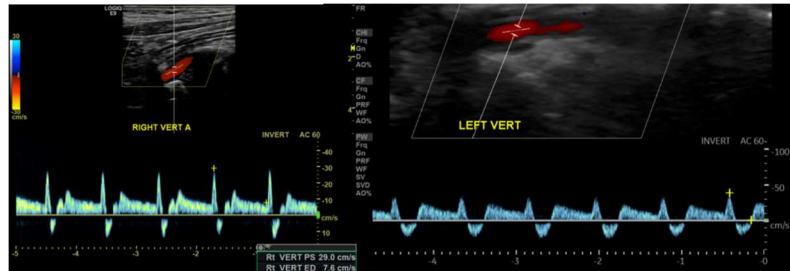
Early systolic deceleration / reversal

Subclavian Steal Physiology / Syndrome

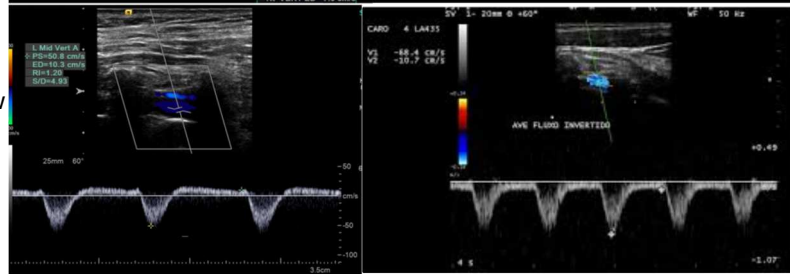


Vertebral Flow Waveforms

Early systolic deceleration / reversal



Bidirectional flow in severe subcl artery stenosis



Subclavian Steal Physiology

BP: RT 169/75
LT 115/71

LT Vert



RT Vert
PSV 113 cm/s



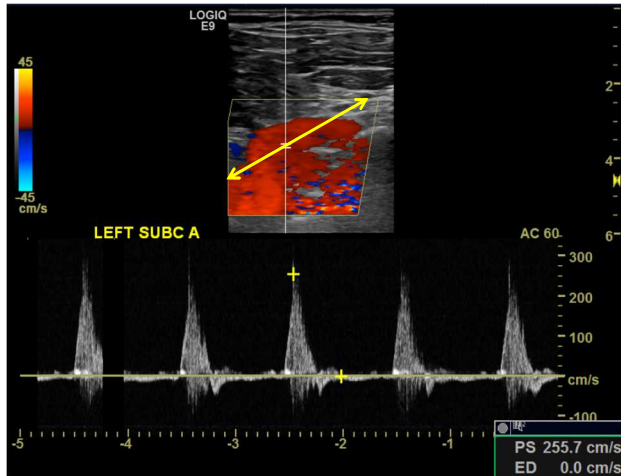
LT SCA



RT SCA



Elevated Velocity in Proximal SCA



65 yrs old female
Routine F/U carotid duplex for mild ICA stenosis

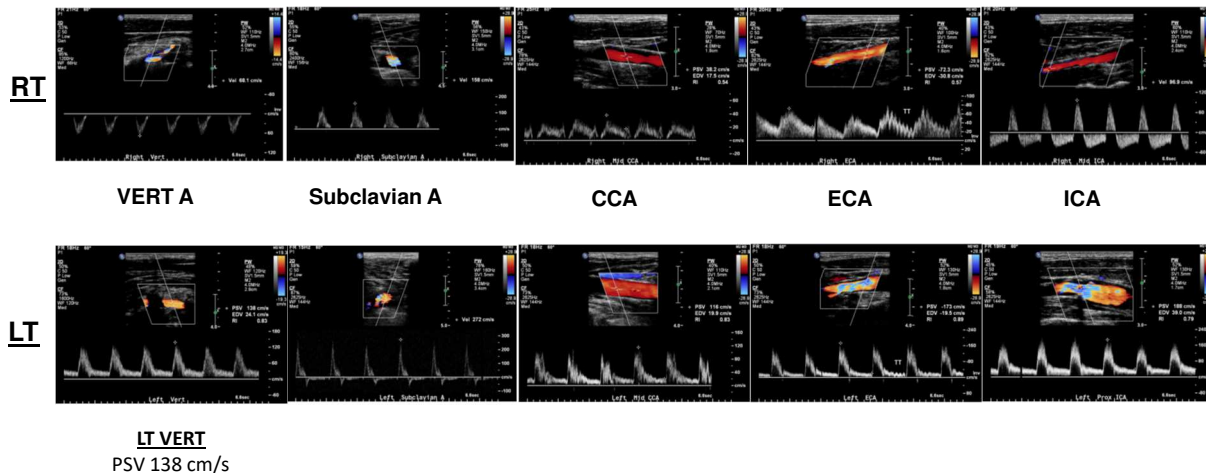
Poor Measuring Angle:

- Tortuosity
- Motion from Cardiac and respiratory source

To get the accurate assessment:

- Gray scale and color Doppler images are important
- Technically get the best angling as much as possible
- Bilateral brachial systolic pressures
- If it is on the right side, ostium can be imaged

Innominate Artery Severe Stenosis



THANK YOU!