

THORACIC OUTLET SYNDROME DOPPLER EVALUATION (TOS)

Interrogation of the blood supply to the upper extremities is evaluated by watching for a decrease or cessation of the arterial signal with a series of arm and head positions with and without breathing maneuvers. Gravity will lessen the triphasic signal as the arm is raised higher, so it is important to remember that you are watching for the decrease or cessation of the **waveform**. The arm must stay in the same plane as the body. The patient should turn his/her head as far to the right/left as the shoulder plane allows. In addition, when facing forward, the head and neck should be relaxed.

TOS patient maneuvers:

- Military Position
 - Seated up straight
 - Shoulders back
 - Head upright
 - Shoulders back
 - Hands in lap

- 90°
 - Seated up straight
 - Arm extended out to the side, shoulder height
 - Palm down

- 180°
 - Seated up straight
 - Arms extended above head
 - Palms forward



Exam Protocol:

- Perform Upper Arterial Doppler (UEA) per protocol.
- Record the baseline flow pattern by placing the PPG sensor on the pad of the #2 digit. Use either double sided tape, Velcro strap or metal clip provided with the Parks Flo-Lab to secure the sensor to the finger.
 - Sweep speed 10mm. This allows us to see the waveform pattern clearly. [00]
 - Amplitude 100 OR **size that BEST documents the waveform**. Amplitude should be consistent for all digits,
- With the patient sitting upright, perform the maneuvers on the following chart while recording digit waveform.
- *OBSERVE* for changes to baseline waveform pattern (No Change, Increased, Decreased or Ceased).

(N = No Change; D = Decrease in signal strength; I = Increased in signal strength C = Cessation of signal)

		N	D	I	C
Military Position	R				

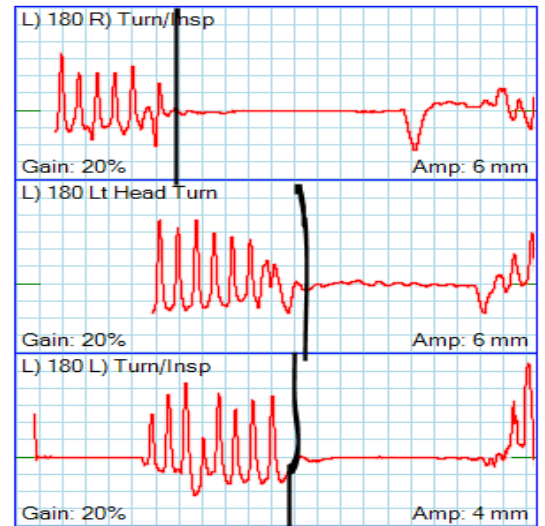
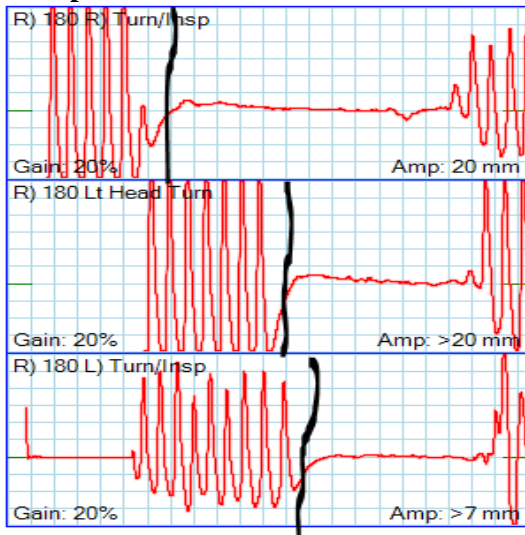
	L				
Inspiration	R				
	L				
Head Turned	R				
	L				
90 Degrees	R				
	L				
Inspiration	R				
	L				
Head Turned	R				
	L				
180 Degrees	R				
	L				
Inspiration	R				
	L				
Head Turned	R				
	L				

NOTE: Additional positions as required.

Question the patient whether there is a specific position that is known to cause symptoms. Record waveforms during these maneuvers. Determine if there is signal loss at the same time the patient experiences symptoms and report these findings.

- **Save a baseline waveform and waveform with positional changes.**

Example:



Note: It is important for the patient to keep his/her shoulder down and that the arm is not locked. "Cradle" the patient's arm in your hand while monitoring the changes in the arterial signal with the various positions. The patient should be sitting upright, not slumped over.

Once exam is completed,

- Verify that required images are stored
- Thank patient for coming, allow him/her to re-dress if needed/escort them out of testing area
- Complete the remainder of the encounter by following the “*Post Processing Procedures.*”

Interpretation of Arterial Waveforms

NORMAL

- The amplitude of any waveform during maneuvers should remain unchanged or increase compared to the baseline. A slight change is not indicative of significant TOS.

ABNORMAL

- Thoracic outlet compression is indicated when the arterial waveform demonstrates a significant, persistent decrease in the waveform amplitude, or the waveform completely disappears during exam maneuvers and the patient experiences symptoms during the pulse change.

NOTE: If exam results in an ABNORMAL finding, proceed with the following:

- Upper Arterial Duplex to include:
 - Grayscale image(s) of the subclavian artery of the abnormal arm(s) showing any irregularities (i.e. – Aneurysm, Narrowing, Stenosis)
 - Spectral(s) of subclavian artery – Proximal, mid, distal and/or area of stenosis including pre and post stenosis.