GUNDERSEN/LUTHERAN ULTRASOUND DEPARTMENT POLICY AND PROCEDURE MANUAL

SUBJECT: Doppler Ultrasound Exam of the Arterial Thoracic Outlet
SECTION: Vascular Ultrasound
ORIGINATOR: Deborah L. Richert, BSVT, RDMS, RVT
DATE: September 13, 2013

APPROVED BY: _____
Jody Riherd MD

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Dave Clayton RDMS RVT

Scheduling: One every 45 minutes.

Prep: None.

Patient Position: Upright, with patient sitting on a chair or the edge of the ultrasound cart facing the sonographer.

Equipment: Colorflow ultrasound unit with a 5 MHz. linear array transducer.

Purpose: To evaluate the subclavian/axillary arterial junction for evidence of stenosis or compression with provocative arm positioning.

Indications: Patients may present with arm and hand weakness, paresthesias, and pain involving the arm and shoulder.

Exam Protocol: A bilateral exam is always performed in order to compare one side to the other. With real-time ultrasound, color and spectral Doppler, just lateral to the clavicle, evaluate the subclavian/axillary arterial junction. This is the location that the artery would be compressed during provocative maneuvers. The color box and Doppler gate should be angled toward the clavicle, with angle correction, using a Doppler angle of 60 degrees or less, with the sample gate parallel to the vessel wall, NOT the flow jet. The SAME ANGLE should be used for each part of the exam. It may be necessary to heel-toe the transducer in order to accomplish this. The vessel is evaluated with the arm to the patient's side (neutral position), 90 degrees abducted, 180 degrees abducted, and the neutral position post provocative maneuvers. The patient's head is turned away from the side that is being evaluated for the 90 and 180-degree abduction images. The vertebral artery on each side is evaluated for direction of flow, waveform, and PSV.

Imaging Protocol: The following images will represent the Doppler Ultrasound Exam of the Arterial Thoracic Outlet. Additional images may be necessary for proper documentation. Please refer to the thoracic outlet worksheet for this exam. The worksheet

needs to be filled out with the needed information at the completion of the exam by the sonographer.

- Right subclavian/axillary arterial junction with color, angle-corrected spectral Doppler, and PSV measurement, with patient's arm in the neutral position and the patient looking straight ahead, making note of the waveform.
- Right subclavian/axillary arterial junction, with color, angle-corrected spectral Doppler, and PSV measurement with patient's head turned away from the side being examined, and the arm abducted 90 degrees, making note of the waveform.
- Right subclavian/axillary arterial junction, with color, angle-corrected spectral Doppler, and PSV measurement with patient's head turned away from the side being examined, and the arm abducted 180 degrees, making note of the waveform.
- Right subclavian/axillary arterial junction, with color, angle-corrected spectral Doppler, and PSV measurement with patient looking straight ahead and the arm back in the neutral position, making note of the waveform.
- Right vertebral artery with color, angle-corrected spectral Doppler, and PSV measurement, making note of the waveform and flow direction.
- Left subclavian/axillary arterial junction with color, angle-corrected spectral Doppler, and PSV measurement, with patient's arm in the neutral position and the patient looking straight ahead, making note of the waveform.
- Left subclavian/axillary arterial junction, with color, angle-corrected spectral Doppler, and PSV measurement with patient's head turned away from the side being examined, and the arm abducted 90 degrees, making note of the waveform.
- Left subclavian/axillary arterial junction, with color, angle-corrected spectral Doppler, and PSV measurement with patient's head turned away from the side being examined, and the arm abducted 180 degrees, making note of the waveform.
- Left subclavian/axillary arterial junction, with color, angle-corrected spectral Doppler, and PSV measurement with patient looking straight ahead and the arm back in the neutral position, making note of the waveform.
- Left vertebral artery with color, angle-corrected spectral Doppler, and PSV measurement, making note of the waveform and flow direction.

Please see the sonographic diagnostic criteria of thoracic outlet syndrome listed on the back of the thoracic outlet worksheet that is attached to this protocol.

References

1. Zwiebel WJ (ed) Introduction to Vascular Ultrasonography, 4th Ed WB Saunders 2000.

DOPPLER ULTRASOUND EXAM
OF
ARTERIAL THORACIC OUTLET

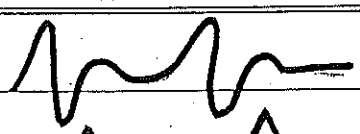
Name:_____ Clinic #:_____ Date: _____

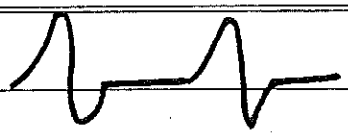
Clinician:_____ Radiologist:_____ Sonographer:_____

Indication: _____

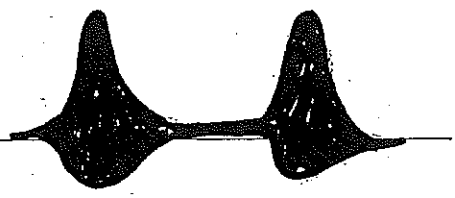
Subclavian/Axillary Arterial Junction Near the Clavicle						
	Right			Left		
Maneuver	PSV m/sec	** Waveform	Comments	PSV m/sec	** Waveform	Comments
Arm Neutral						
Arm 90° Abduct*						
Arm 180° Abduct*						
Arm Neutral (Post maneuver)						
Vert. art.			Flow direction:			Flow direction:

* Head turned to contralateral side ** Waveform appearance

T = Triphasic 

B = Biphasic 

H = Hyperemic 

PST = Post Stenotic Turbulence 

M = Monophasic 

Comments:_____

_____

_____

Impression:_____

_____

_____

Radiologist: _____

Sonographer: _____

SONOGRAPHIC DIAGNOSTIC CRITERIA OF THORACIC OUTLET SYNDROME

1. A change in the arterial waveform that causes at least a doubling of peak systolic velocity with arm hyperabduction compared with the waveform obtained with the arm in a neutral position,

   Or

2. A complete loss of the Doppler arterial waveform at the site of compression with arm hyperabduction associated with a monophasic postocclusive waveform.

   These findings indicate an exam that is positive for thoracic outlet syndrome.

3. Mild stenosis of the subclavian artery is present when the increase in the peak systolic velocity with hyperabduction is less than doubled.

(These criteria are from the article: Thoracic Outlet Syndrome: Evaluation of the Subclavian Vessels by Color Duplex Sonography; by D. Longley, et. al. AJR 158-630, March 1992).