GUNDERSEN HEALTH SYSTEM ULTRASOUND DEPARTMENT POLICY AND PROCEDURE MANUAL

SUBJECT: Transcranial Doppler in the Setting of Vasospasm
SECTION: Vascular Ultrasound
ORIGINATOR: Deborah L. Richert, BSVT, RDMS, RVT
DATE: March 1, 2017

APPROVED BY: _____
Jody Riherd MD

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Dave Clayton RDMS RVT

Purpose: To evaluate for vasospasm in the circle of Willis and vertebrobasilar system in the setting of intracranial aneurysm rupture and/or spontaneous or traumatic subarachnoid hemorrhage.

Exam Protocol:

- Using the transtemporal window the following vessels are evaluated bilaterally in the Circle of Willis with color and spectral Doppler (do **NOT** angle correct), and the highest TAMAX is recorded on the TCD worksheet for each vessel: MCA, ACA, terminal ICA, and PCA P1 segment.
- Using the suboccipital window the following vessels are evaluated with color and spectral Doppler (do **NOT** angle correct), and the highest TAMAX is recorded on the TCD worksheet for each vessel: RT vertebral artery, LT vertebral artery, and basilar artery.
- Using the submandibular window the most distal visualized portion of the RT and LT internal carotid arteries are evaluated with color and spectral Doppler (do **NOT** angle correct), and the highest TAMAX is recorded on the TCD worksheet for each vessel. **It is recommended to use the TCD probe to evaluate the distal internal carotid arteries in order to angle up and under the mandible and evaluate each internal carotid artery as far distally as possible.**
- The Lindegaard Ratio is calculated for both sides, RT and LT, and recorded on the TCD worksheet: **MCA TAMAX** cm/s / **Distal ICA TAMAX** cm/s.

TAMAX (cm/s)	Lindegaard (MCA/Dist. ICA) Ratio*	Interpretation
< 120	< 3	Normal
120 - 200	3 - 6	Mild Vasospasm
> 200	> 6	Severe Vasospasm

***Criteria provided by Dr. M. Kabbani, Gundersen Health System Dept. of Neurosurgery**

Imaging Protocol:

- RT MCA
- RT ACA
- RT Terminal ICA
- RT PCA P1 segment
- RT distal ICA*******
- LT MCA
- LT ACA
- LT Terminal ICA
- LT PCA P1 segment
- LT distal ICA***
- RT Vertebral Artery
- LT Vertebral Artery
- Basilar Artery

***While we do not invert the color scale when evaluating the vessels in the circle of Willis, Dr. Riherd would like us to invert the color scale for evaluation of the distal ICAs so that the color is red. This is in an effort to avoid confusion by those that are not as familiar with reading TCD studies and because we invert the color scale when performing our carotid ultrasound exams.

The following are some comments from Keith Fujioka, BS, RVT, FSVU. He is considered one of the TCDI gurus in the world of vascular sonography:

"With blind TCD we assume the angle is 0 for every vessel segment, largely because we do not have an image to tell us otherwise. This is not a guess, however, as we know based on the typical anatomical course of the vessels and where we place the probe and aim it, that an assumption of 0 degrees is reasonable... With TCDI, I would also not angle correct, but in saying this it is important to recognize that when we refer to distal cervical ICA when performing TCD, this is far different than what we mean when performing a carotid duplex scan. As you likely already know, the TCDI transducer should be under the mandible aimed up and not aimed into the neck like when doing carotid duplex scanning. Also, the SV depth should be as far up as you can go, but at least 3cm... This is what allows us to assume the angle is 0 when doing blind TCD and thereby is a reasonable assumption when doing TCDI when using the same probe placement/angulation/SV depths. Distal cervical ICA when doing TCD is that portion of the ICA well above the angle of the jaw.

As far as using a larger sample volume- I would certainly use a larger sample volume than what you are probably using when you do carotid duplex scanning, simply to aid in finding the desired Doppler signal and staying on it. Whether you use a large or small SV, however, should not materially change the information you are interested in, which is the PSV, EDV and Mean-V (TAMAX)."

Gundersen Health System
Department of Diagnostic Ultrasound

Transcranial Doppler Worksheet

Patient Name: _____ **Med. Record Number:** _____

EXAM DATE >>>>>>>							
RT MCA* TAMAX cm/s							
RT ACA TAMAX cm/s							
RT TERMINAL ICA TAMAX cm/s							
RT PCA (P1) TAMAX cm/s							
RT VERT TAMAX cm/s							
RT DIST ICA* *TAMAX cm/s*							
RT LINDEGAARD* ***RATIO*** *(MCA/ICA)*							
BASILAR ART TAMAX cm/s							
LT MCA* TAMAX cm/s							
LT ACA TAMAX cm/s							
LT TERMINAL ICA TAMAX cm/s							
LT PCA (P1) TAMAX cm/s							
LT VERT TAMAX cm/s							
LT DIST ICA* *TAMAX cm/s*							
LT LINDEGAARD* ***RATIO*** *(MCA/ICA)*							

TAMAX (cm/s)	**Lindegaard (MCA/Dist. ICA) Ratio***	**Interpretation**
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