E. TRANSCRANIAL DOPPLER EXAMINATION (TCD)

ROUTINE TCD

1. POLICY

1.1. Test Description

A non-invasive diagnostic test, which shall evaluate intracranial cerebral circulation through intact skull.

1.2. Equipment

RIMED Intraview with 2 MHz pulse Doppler transducer

1.3. Settings

For a typical diagnostic TCD examination, a fast 3-5 sec sweep speed that allows to see details of the waveform and spectrum shall be used. To shorten the time necessary to find the window and to identify different arterial segments with a single gate spectral TCD, the examination should begin with the maximum power and gate setting (i.e. power 100%, gate 10-15 mm) for the transremportal and transforaminal approaches. The power shall be decreased to minimum power of 14% and maximum power of 28% for transorbital approach.

1.4. Goals of a “non-image-guided” single gate spectral TCD examination

1.4.1. The course of each major branch of the circle of Willis with spectral display shall be followed.

1.4.2. The highest velocity signals shall be identified, optimized and stored.
1.4.3. Any abnormal or unusual waveforms shall be identified, optimized and stored.

1.5. Patient Preparation

No patient preparation shall be required. 45 minutes to 1 hour and 30 minutes shall be allotted for the examination.

1.6. Patient Position

The test shall be performed with patient lying in a supine position. The examiner should be seated at the back of patient’s head.

1.7. Examination Procedure

1.7.1 Transtemporal Insonation

The machine shall be set at the depth of 55 mm (mid M1 MCA). The probe shall be placed just above the zygomatic arch and should be aimed slightly upwards and anterior to the contralateral ear/window. Find any flow signal. Too anterior and too posterior angulation should be avoided. Find a flow signal directed towards the probe, which resembles MCA flow. A normal MCA flow should be low resistance waveform similar to the flow pattern in the ICA. The depth shall be decreased. The signal to the distal M1 key-point of insonation shall be followed without losing the signal. The highest velocity or any abnormal signal of distal M1 MCA signal at 45 mm shall be stored. Return to 55 mm depth and follow the M1 MCA stem to its origin at 60 mm (proximal M1 MCA). Find the MCA /ICA bifurcation at approximately 65 mm and both proximal M1 MCA and proximal A1 ACA signals should be obtained. Bi-directional signal of the bifurcation shall be stored.
Return to bifurcation at 65 mm. The distal A1 ACA shall be followed to the midline depth range of 67-70 mm. The highest velocity and any abnormal signal. Shall be stored.

Return to bifurcation find the terminal ICA signal just inferior and sometimes slightly posterior to his bifurcation at the depth of 70 mm. The transducer should be slowly turned posteriorly by 10-30 degrees. Find PCA signals directed towards (P1) and away (P2) from the probe. The PCA signal with the highest velocity shall be stored.

1.7.2. Transorbital Insonation

The power should be decreased to minimum of 14% up to 28%. The depth shall be set at 45-49 mm and the transducer shall be placed over the eyelid and shall be angled slightly medial. The signal from the distal ophthalmic artery shall be determined and stored.

The depth should be increased to 60-65 mm and find the ICA siphon flow signals. The siphon signals are usually located medially in the orbital window. Store bi-directional signals at 65 mm (C3 or the siphon genu).

1.7.3. Transforaminal Insonation

The system should be back to full power (100%).
The transducer shall be placed at midline an inch below the edge of the skull and should be aimed towards the bridge of the nose. The depth shall be set at 80 mm with medial and slightly upward angulations. A flow signal directed away from the probe (below zero baselines) shall be identified. This signal shall be arbitrarily assigned to the proximal basilar artery. The depth shall be increased to 90 mm (mid BA segment) the flow directed away from the probe shall be followed. Follow the distal BA segment to the depth of 100+ mm until it disappear or is replaced by the anterior circulation signal. The highest velocity signal shall be obtained at the most distal depth of the basilar artery insonation.

The probe shall be placed about an inch laterally to the midline and shall be aimed towards the bridge of the nose or slightly towards the contralateral eye. Find the Vertebral artery (depth 60 mm) flow signal directed away from the probe. The course of the terminal VA at 70 mm shall be followed. Store the VA signals at 60 mm or at the depth of the highest velocity signal.

Repeat the Vertebral artery examination steps for the contralateral vessel from 60 mm to 70 mm depth. Store the VA signals at 60 mm or at the depth of the highest velocity signal.

2. PROCEDURE – Routine Transcranial Doppler Examination Outpatient

2.1. Med. Tech. asks for the request form from the patient / relative.

2.2. Med. Tech. interviews the patient and encodes the patient data in the computer.

2.3. Med. Tech prepares the charge slip and asks the patient / relative to proceed to the cashier’s office located at the basement for payment of procedure. The reader’s fee shall be paid directly to the Med. tech. on duty.
2.4. Med. Tech. copies the official receipt number.

2.5. Patient or relative will be interviewed to assess patient’s medical status.

2.6. Orients patient about the diagnostic procedure to be done.

2.7. Patient to lies down (supine) in the examination table.


2.9. Examination of the intracranial blood vessels starts with the insonation of the anterior cerebral circulation using the temporal windows. Insonation of the ophthalmic arteries and carotid siphon will follow using the transorbital windows. The last to be examined will be the posterior circulation.

2.10. Med. tech wipes patients head with clean tissue paper.

2.11. Patient /relative will be given instruction to come back at the Neurovascular laboratory after three working days for the release of official result.

2.12. Med. tech copies the readings (mean flow velocity, pulsatility index) from the summary and makes the initial results.

2.13. Sonographer makes the final interpretation.

2.14. Medical Technologist types the official result in the official result form.

2.15. Official results will be release after three working days.

2.16. Records and files official results (file copy).
2. PROCEDURE – Routine Transcranial Doppler Examination Inpatient

2.1. Nurse from the requesting unit sends the request form / charge slip to the Neurovascular lab.

2.2. Med. Tech. calls the nurse from the requesting unit and ask if the patient is already prepared for the TCD examination.

2.3. If the request is TCD-station then the med. tech. ask the nurse to bring the patient to the Neurovascular lab., but if the request is TCD-bedside then the med. tech. brings the TCD machine to the patient’s room.

2.4. Med. tech. reads the patient’s chart to be able to know some information about the patient medical status and the requesting doctor. The chief complaint and history of present will be noted.

2.5. Orients patient / relative about the diagnostic procedure to be done

2.6. Patient lies down (supine) in the examination table if it is in the station, but if it is at bedside just let the patient be in a supine position in his / her own hospital bed.


2.8. Examination of the intracranial blood vessels starts with the insonation of the anterior cerebral circulation using the temporal windows. Insonation of the ophthalmic arteries and carotid siphon will follow using the transorbital windows. The last to be examined will be the posterior cerebral circulation.
2.9. Med. tech wipes patients head with clean tissue paper.

2.10. If TCD was done at the station med. tech calls the unit where the patient came from and asks the nurse to fetch the patient, while if it was done at bedside the med. tech. brings the machine back to the laboratory.

2.11. Med. tech. executes the procedure and reader’s fee in the med. trak.

2.12. Med. tech copies the readings (mean flow velocity, pulsatility index) from the summary and makes the initial results.

2.13. Sonographer makes the final interpretation.

2.14. Types official results and releases after three working days.

2.15. Records and files official results (file copy).
3. FLOWCHART - TRANSCRANIAL DOPPLER EXAMINATION

Med tech gets request

Yes

Med tech calls the nurse

No

TCR at station

Yes

Med tech brings TCD machine to the bedside

Nurse/nurse aide brings patient to neurovascular lab

Med tech reads the chart

Med tech prepares and instructs patient for the procedure

Med tech performs TCD examination

TCR at station

No

Med tech brings the TCD machine back to the lab/bedroom

Med tech calls the nurse to pick the patient from the lab

Med tech completes procedure and PF in the metrics

Med tech reviews the summary for initial interpretation of TCD

Sonographer reviews the summary for final interpretation of TCD

Med tech types and releases result

Recording and filing of official results

Med tech interviews and enters patient data in the computer

Prepare charge slip/patient pay in the cashier

Copy ORW and let patient pay for the reader’s fee

Interview patient and enter history

Med tech prepares and instructs patient for the procedure

Med tech performs TCD exam

Med tech assures patient/relative to come back after 3 working days for the result

Med tech reviews the summary for initial interpretation of TCD

Sonographer reviews the summary for final interpretation of TCD

Recording and filing of official results

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