Carotid Duplex Protocol

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No disclosures
Policy and Procedure
Policy and Procedure

These documents cover the big picture of how an area of testing is approached including:

- Indications
- Patient history
- Physical exam
- Risk factors
- Patient positioning
- Exam technique considerations
<table>
<thead>
<tr>
<th>Sequence</th>
<th>Location</th>
<th>Level</th>
<th>Orientation</th>
<th>Mode</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Common carotid artery</td>
<td></td>
<td>Trans/Long Split</td>
<td>B</td>
<td>CCA</td>
</tr>
<tr>
<td>2.</td>
<td>Bifurcation</td>
<td></td>
<td>Trans/Long Split</td>
<td>B</td>
<td>Bif (Label ICA/ECA)</td>
</tr>
<tr>
<td>3.</td>
<td>Internal carotid artery</td>
<td>Proximal</td>
<td>Trans/Long Split</td>
<td>B</td>
<td>ICA Proximal</td>
</tr>
<tr>
<td>4.</td>
<td>Internal carotid artery</td>
<td>Mid</td>
<td>Trans/Long Split</td>
<td>B</td>
<td>ICA Mid</td>
</tr>
<tr>
<td>5.</td>
<td>Common carotid artery</td>
<td>Proximal</td>
<td>Long</td>
<td>C/D</td>
<td>Calcs Package</td>
</tr>
<tr>
<td>6.</td>
<td>Common carotid artery</td>
<td>Mid</td>
<td>Long</td>
<td>C/D</td>
<td>Calcs Package</td>
</tr>
<tr>
<td>7.</td>
<td>Common carotid artery</td>
<td>Distal</td>
<td>Long</td>
<td>C/D</td>
<td>Calcs Package</td>
</tr>
<tr>
<td>8.</td>
<td>External carotid artery</td>
<td></td>
<td>Long</td>
<td>C/D</td>
<td>Calcs Package</td>
</tr>
<tr>
<td>10.</td>
<td>Internal carotid artery</td>
<td>Mid</td>
<td>Long</td>
<td>C/D</td>
<td>Calcs Package</td>
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<tr>
<td>11.</td>
<td>Internal carotid artery</td>
<td>Distal</td>
<td>Long</td>
<td>C/D</td>
<td>Calcs Package</td>
</tr>
<tr>
<td>12.</td>
<td>Vertebral Artery</td>
<td>Mid</td>
<td>Long</td>
<td>C/D</td>
<td>Calcs Package</td>
</tr>
<tr>
<td>13.</td>
<td>Subclavian Artery</td>
<td>Proximal</td>
<td>Long</td>
<td>B</td>
<td>SCA</td>
</tr>
<tr>
<td>14.</td>
<td>Subclavian Artery</td>
<td>Proximal</td>
<td>Long</td>
<td>C/D</td>
<td>Calcs Package</td>
</tr>
</tbody>
</table>
Evaluate fully

B-mode Imaging

1. Transverse from clavicle to mandible
   a. Proximal common carotid artery (CCA)
   b. Mid CCA
   c. Distal CCA
   d. Bifurcation
   e. Proximal internal carotid artery (ICA)
   f. Mid/distal ICA
Evaluate fully

2. Longitudinal plane from clavicle to mandible
   a. Proximal common carotid artery (CCA)
   b. Mid CCA
   c. Distal CCA
   d. External carotid artery (ECA)
   e. Proximal internal carotid artery (ICA)
   f. Mid ICA
   g. Distal ICA
Identify the location in the CCA where velocity is used to calculate ICA/CCA ratio

- Mid CCA velocity to be used in the ratio should be obtained about 2 cm proximal to the flow divider
- Do not say “bulb” as this is not a region but an anatomic widening that occurs in the distal CCA to proximal ICA
- Watch angle correction: align to vessel walls
Protocol
Protocol

**Image Description:**
- The image shows an ultrasound scan with a focus on a blood vessel, likely a carotid artery, with the label "Rt Prox CCA" indicating the right proximal common carotid artery.
- The scan displays Doppler waveforms with color-coded velocities and numeric readings.
- The top right corner of the image shows text indicating velocities: "Rt Prox CCA PS 61.0 cm/s" and "Rt Prox CCA ED 14.4 cm/s."
Protocol
Protocol
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Protocol
Protocol
Protocol
Protocol

RIGHT BIFURCATION ICA
Protocol

What is missing from our protocol for the image sequence on the right?

Common carotid artery, Mid, Long, C/D
Protocol

Did you notice anything unusual about the systolic upstroke in the study?

Patient has aortic stenosis, delaying the upstroke bilaterally.
Obtain data as far proximally as possible
Subclavian artery evaluation

Obtain and document bilateral brachial blood pressures prior to performing cerebrovascular examinations.

Blood pressure symmetry is important in determining the presence and severity of subclavian artery stenosis.

If you find a pressure gradient of ≥20 mmHg, this may be indicative of a significant pressure reducing lesion in the upper extremity arteries.

- Bilateral subclavian artery stenosis may be present creating lowered BP bilaterally.
Subclavian Artery

The proximal subclavian artery is evaluated in all patients, with additional images added when stenosis is identified. The following signs, symptoms, or conditions increase suspicion for hemodynamically significant subclavian artery disease:

- Discrepancy in brachial blood pressures ≥20 mmHg
- Abnormal flow in the extracranial vertebral artery
- Bruit of unknown origin
- Velocity increase in the proximal subclavian artery
Subclavian Artery

• There are no firm velocity criteria for the subclavian or brachiocephalic (innominate) arteries

• Considering that the normal velocity range in the adult aorta, carotid and femoral arteries is 60-100 cm/sec, velocities over 200 cm/sec are **suspicious** for >50% stenosis

• Proceed as far proximally as possible and include waveforms more distally to look for turbulence or delayed upstroke
Carotid Duplex Cases: Case 5

Right Subclavian prox
341 PSV
Carotid Duplex Cases: Case 5

Right Subclavian mid
203 PSV w/ turbulence
Carotid Duplex Cases: Case 5

Left Subclavian
326 PSV
Carotid Duplex Cases: Case 5
Optimize B-mode
Optimize B-mode
Optimize B-mode
Optimize gain settings

Spectral Doppler gain appropriate

Spectral Doppler gain too high and then decreased
Color and spectral Gain

Spectral Doppler gain too high

Color Doppler gain too high
Fully document occlusion
Fully document occlusion
Fully document occlusion

Power Doppler
Reporting basics

The technologist should get the following information from each patient about the indications/symptoms for which he/she is complaining and document the answers in the patient record:

Onset
Duration
Methods of relief

Frequency
Radiation
Associated symptoms
Reporting basics

Identification of physical findings must be evaluated and documented in the patient record, noting location and severity. These physical signs include, but are not limited to:

Gait
Strength of grip
Facial drooping
Speech patterns or slurring
Identify when to add TCD: always of in view of findings or symptoms

In NAVIX:
Complete TCD added

- >50% ICA stenosis

- Symptoms of TIA, CVA or VBI with no significant extracranial carotid disease
Identify when to add TCD: always of in view of findings or symptoms

In NAVIX:
Limited TCD (OA and Siphon) added:

• Plaque noted during the Extracranial evaluation
Carotid Duplex Examination: Quality

- Consistency in examination and interpretation methodology
- Optimization of B-mode and Doppler
- Recognize when your standard criteria don’t fit the case
- Comparison to prior studies
- Review of cases produced in your laboratory
Thank you for your attention and for this beautiful meeting location!