

# Vascular department

## Carotid protocol

This document should be used in conjunction with the joint recommendations (1) and the Society for Vascular Technology Professional Standards Committee Guidelines for Carotid Duplex Assessment (2).

### **Probe type**

Linear 5MHz to 7.5MHz although high frequency/ curvilinear probe utilised when required

### **Examination**

Patient lies supine and neck exposed. Standard examination is a bilateral assessment, examining the arterial supply of the common carotid artery (CCA), carotid bulb and bifurcation of the internal carotid artery (ICA) and the external carotid artery (ECA) and the most accessible extra cranial sections of the ICA and ECA. The vertebral artery direction of flow and if the presence of reverse flow is detected, subclavian artery should be examined.

### **B mode assessment**

Initial B mode assessment a full sweep in transverse plane is completed to identify level of bifurcation, if it is high or particularly low, this should be documented. Using a reference point for example angle of jaw. Any plaque including echogenicity and surface characteristics (irregularity, smooth, ulcerated) should be mentioned.

### **Colour flow assessment**

Using colour flow modality a full sweep in transverse is completed then in longitudinal plane the CCA is followed from the proximal section to the furthest distal point of ECA and ICA. Colour flow should identify filling defects, occlusion and velocity changes/turbulence, although diagnosis cannot be made solely on colour flow alone.

As soft plaque has the same echogenicity as blood, colour flow is the best modality for identification.

### **Doppler assessment**

In longitudinal plane with colour and Doppler (angle of 45-60°) all carotid arteries are assessed for areas of velocity increase/ turbulence. Peak systolic velocities (PSV) and end diastolic velocities (EDV) should be taken as a minimum from Distal CCA, ICA, ECA (only PSV required). If significant plaque has been identified with B mode/ colour then further spectral Doppler samples are taken to investigate velocity increases and analyse the degree of stenosis. Images saved should document the findings of the investigation, for example multiple images should be taken of severe disease in the ICA. The anatomical location of any haemodynamically significant stenosis and length should be documented. It is essential patency distal to stenosis is recorded. Atypical waveforms should be documented. Tortuous vessels may be unreliable as velocities can be elevated due to this. The following table (table 1) can be utilised to support carotid disease.

Percentage Stenosis (NASCET)	Internal carotid peak systolic velocity cm/sec	Peak systolic velocity ratio ICA PSV / CCA PSV	St Mary's Ratio ICA PSV / CCA EDV
<50	<125	<2	<8
50-59	>125	2-4	8-10
60-69			11-13
70-79	>230	>4	14-21
80-89			22-29
>90 but less than near occlusion	>400	>5	>30
Near occlusion	High, low-string flow	Variable	Variable
Occlusion	No flow	Not applicable	Not applicable

Table 1. Criteria for Extra cranial carotid artery duplex assessment

#### **Outcomes-**

TIA clinic request- if no significant disease is seen upload to Lorenzo only

TIA clinic- Disease 50% or higher the stroke consultant requests to be directly informed of the result

Any other referrals (Vascular/Ophthalmology/neurology)- if no significant disease is seen inform via email

Any other referrals (Vascular/Ophthalmology/neurology)-Disease 50% or higher- contact consultant directly and inform of the result.

#### **References**

- 1) Oates CP et al., Joint Recommendations for Reporting Carotid Ultrasound Investigations in the United. <https://pubmed.ncbi.nlm.nih.gov/19046904>
- 2) Society for Vascular Technology Professional Standards Committee Guidelines for Carotid Duplex Assessment <https://www.svtgbi.org.uk>