

CAROTID ARTERY ULTRASOUND GUIDELINES

REFERRAL SOURCES:

- Acceptance of requests by sonographers (see below) only applies to referrals from Vascular Surgeons, Stroke physicians, Neurology physicians and A &E
- Request accepted from other clinical teams, including G.P.s, only after Radiologist vetting approval.

SONOGRAPHERS VETTING PROTOCOLS:

[A] Transient Ischaemic Attacks (TIAs)

- ABCD2 scores greater than or equal to 4 are high risk for stroke.
- In-patient's - Require US within 24hrs of referral or first working day list if possible.
- Out-patients - US within 48hours referral or first working day list if possible.
- ABCD2 score of 3 or less.
- U/S within 7 days

[B] Stroke (CVA) - this admission only

- Weakness of 1 side body / arm / leg / face or combination of. Also need confirmation that the patient can self care and is non-debilitated.
- Sensory disturbance of 1 side (pins and needles / numbness)
- Speech disturbance

[C] Other indications

- Carotid bruits for patients scheduled for major abdominal or cardiac surgery. No other bruits accepted and need discussing with vascular radiologist.
- All remaining requests including those for patients with;
 1. Funny turns / blackouts faints
 2. Evidence of old strokes on head imaging
 3. Posterior circulation events including ataxia and diplopia [see glossary]

MUST BE DISCUSSED WITH A RADIOLOGIST

CAROTID DUPLEX PROTOCOL

PATIENT PREPERATION: None

SCAN TIME: 20 minutes

Patient position; Supine with head rotated to opposite side intended to be scanned to allow access to carotid vessels

Equipment set up; Linear mid frequency probe 9-3MHz), curvilinear low frequency (5-1MHz) probe may be required for deeper tortuous vessels.

PRESET: Carotid or equivalent setting.

SUGGESTED MINIMUM IMAGES:

B Mode - Plaque assessment:

- LS - CCA - Intimal thickness of posterior wall intima at non plaque site can be measured (normally measures less than 0.8mm. Intimal thickness in excess of 1mm can be a surrogate marker for cardiovascular disease)
- LS -BULB /ICA/ECA - for plaque categorisation/extent
- TS BULB/BIFURCATION

Colour Mode/Spectral Doppler+/- Power Doppler images

- Follow entire length of CCA to bulb recording spectral Doppler samples of the CCA
- Record image of proximal ICA, assess ICA as distally as possible with spectral Doppler measurements in Peak Systolic Velocity [PSV] at prox, mid and distal sites
- Record relevant further images of any pathology with spectral Doppler samples to record the highest PSV and End Diastolic Velocity [EDV] at any stenotic site
- IC/CC ratio calculated from highest PSV demonstrated anywhere in ICA and CCA.
- Assess patency of ECA and record spectral Doppler sample using temporal tapping if required to confirm vessel identity.

- Power Doppler imaging may help in suspicion of vessel occlusion or where colour filling is not optimal
- Locate the vertebral artery lying between the vertebral transverse processes and record spectral Doppler trace. Note whether flow is antegrade or retrograde.

SPECTRAL DOPPLER MEASUREMENTS:

- Spectral Doppler measurements used to categorise degree of stenosis within the proximal ICA (Proximal 2cm of ICA, efferent to bulb).
- See 'carotid stenosis quantification' information sheet for plaque categorisation and velocity criteria

EVIDENCE BASE:

- 'Vascular Laboratory Practice part 2 , 'extra and intra cranial arterial assessment ' - Institute of Physics in Engineering and Medicine in Association with the Society of Vascular Technologists of GB and Ireland.
- Carotid stenosis in the real world - can Doppler ultrasound replace angiography in a District General Hospital Setting? Orgles et al: Clinical Radiology 1999, 54, 655-658.
- Joint recommendations for reporting carotid ultrasound investigations in the United Kingdom, Oates et al: Eur., J. Vascular and. Endovascular. Surgery, 2009, 251-261
- Carotid Intimal thickness is related to Cardiovascular Risk Factors ; Davis et al, Circulation 2001; 104; 2815-2819
- Carotid Artery stenosis: Grey scale and Doppler US diagnosis: Grant et al; Radiology 2003 ,229, 340-346
- Carotid Duplex Sonography. A multicentre recommendation for standardised imaging and Doppler criteria ; Bluth et al; Radiographics, May 1988, Volume 8, number 3, 487-506
- Effect of Contralateral disease on duplex measurements of internal carotid artery stenosis, Ray et al; British Journal of Surgery, 2000, 87 1057-1062.

GLOSSARY OF USEFUL TERMS:

- Aphasia - absence of speech
- Amaurosis fugax -transient loss of vision in 1 eye only, unlikely to be carotid disease if both eyes.
- Vertigo - dizzy, whirling/spinning sensation
- ataxia - loss of muscular coordination
- diplopia- double vision
- dysarthria - mechanical difficulty to form speech
- dysphagia - difficulty swallowing
- dysphasia - impairment to communicate via speech
- dysphonia -inability to control voice box
- hemianopia -loss of half visual field, usually vertical
- hemiparesis-loss of control of one side of body
- scotoma -area of diminished vision
- tinnitus- ringing in the ear
- TMB - transient monocular blindness
- TACS - total anterior circulation stroke
- PACS - partial anterior circulation stroke
- POCS - posterior circulation stroke
- LACS - lacunar circulation stroke

CAROTID STENOSIS QUANTIFICATION:

Use a small Doppler gate and obtain the highest PSV, normal velocities within 30 - 110cm/s

Characterise plaque appearances into:

TYPE 1:	Predominantly echopoor
TYPE 2:	Echopoor with Echogenic areas
TYPE 3:	Echogenic with Echopoor areas
TYPE 4:	Predominantly Echogenic
TYPE 5:	Predominantly Calcified

(Grey Weale classification)

DIAMETER STENOSIS:

PSV (cm/s)	EDV (cm/s)	%	
< 150	<75	0 - 49	not significant
150 - 230	<75	50 - 69	medical treatment
> 230	>75	70 - 99	surgical treatment
None		occluded	

If ICA PSV < 40 cm/s , with no EDV, this suggests a 95% stenosis

Occlusions -

- *is there CCA diastolic flow - absent on affected side supports occlusion*
- *is there CCA flow? are ECA and ICA occluded or collaterally filled?*
- *Dampened CCA flow with low velocities suggest ICA/ECA stenosis*
- *If ICA occluded - ensure identify ECA with temporal tapping*
- *If ICA occlusion and raised contralateral CCA velocities, may consider downgrading contralateral ICA stenosis - discuss with radiologist*

FOR SUSPECTED TIA:

ABCD2 score [cards not needing vetting by radiologist]

ABCD2 score greater or equal 4 = [high risk]

ABCD2 score less than 4 = [low risk]

				Total
A	Age	>60	1 point	
B	Blood Pressure	140 / 90 mmHg Or Diasystolic > 90 mmHg	1 point	
C	Clinical Features	Unilateral weakness	1 point	
		Speech disturbance	1 point	
		Nothing	0 point	
D	Duration of symptoms	> 60 mins	1 point	
		10- 59 mins	1 point	
		< 10 mins	0 point	
D	Diabetes	Yes	1 point	
		No	0 point	

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