



Image Protocol – PACS

Change History:

Version Number	Reason for Change	CRN	Effective Date
01	New Issue	n/a	05/04/2013
02	Additional protocols	103	06/03/2014
03	Addition of vein map protocol	134	17/12/2015
04	Protocol amendments	161	16/06/2016
05	Change order of modality protocol	193	05/10/2017
06	Addition of UHSM AAA/EVAR protocol	194	20/10/2017
07	Alter popliteal vein protocol	209	23/01/2018
08	Amend upper limb DVT protocol	255	12/11/2019
09	AAA amendment	263	06/02/2020
10	AVP removal	292	26/01/2023
11	GCA addition	304	01/02/2023
12	GCA measurement	339	28/04/2023
13	Removal of 5 sec cineloop at UHSM	383	31/01/2024
14	Scope to save images addition, probe orientation standardisation, removal of DIEP	410	04/03/2024

Prepared By	Date	Approved by	Date
T.Gall	05/04/2013	IVS Board	05/04/2013



Image recording protocol for Picture Archive and Communication system (PACS)

Guidance from the Royal College of Radiologists in 2011 (1,2) state that recorded images form part of the patient record, together with the written report of the investigation. They therefore need to be stored and treated as patient record documents.

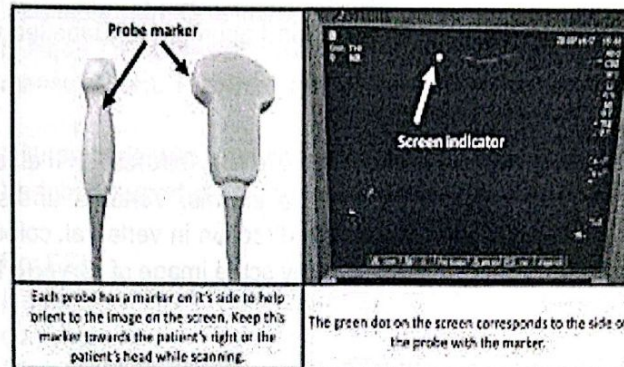
Ultrasound is a dynamic imaging modality and recording and storing of images are vital part of the process to diagnose disease or exclude disease and to produce a written report. The scope and purpose of recording and saving images to PACS is multifactorial:

1. They are a record of findings showing disease and measurements taken and adherence to scanning protocol, as well as demonstrating normality.
2. They support report writing and should back up and verify the written report.
3. They allow for review in a training situation and in follow-up patients undergoing surveillance.
4. They provide quality assurance.
5. They provide evidence that the examination was carried out to a competent standard.
6. They provide evidence that companywide, local and site-specific protocols were followed.
7. They may be used in teaching, reporting unusual cases and audit.

Probe orientation standardisation:

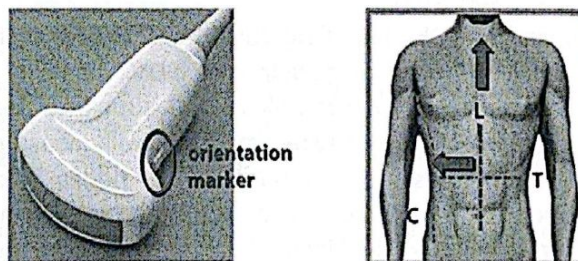


A standardised orientation is used when producing and storing images so that anyone reviewing the images can identify the view. Most probes have a notch. The notch represents the same side as the dot located on the ultrasound screen. It is good practice to identify this (sometimes tapping on the probe is valuable to confirm setting) prior to scanning to ensure the correct orientation if gained.



Standard orientation always has the notch on the probe to either:

- The patient's head for all longitudinal scans
- To the patient's right when scanning the abdomen
- To the patient's center for transverse scans when scanning the neck, lower and upper limbs



The orientation marker should be pointed:

- To the patient's right side of the patient for a transverse scan
- To the patient's head for a longitudinal scan

Source: Manoj K. Karmakar, Edmund Soh, Victor Chee, Kenneth Sheah:
Atlas of Sonoanatomy for Regional Anesthesia and Pain Medicine
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Image acquisition protocol:

Document control - R.Pole
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All images must be labelled with anatomy and orientation (LS view, TS/AP view).

Ensure all patient data is entered as appropriate.

This list is not exhaustive, it is a minimum requirement. Other images can be captured at the users discretion especially if abnormal/ unusual pathology is noted.

All standard images should be recorded and appropriately labelled with minimum number of images as below:

1. Carotid –

- a. Right/Left side - CCA, ECA and ICA (bifurcation if diseased) demonstrating colour and waveforms. Vertebral and subclavian arteries demonstrating flow direction in vertebral, colour and waveforms. High quality grey scale image of ICA and bifurcation.

2. TCD – no images taken

3. Peripheral Arterial and waveform assessment – Right and left CFA, POP, PTA and ATA waveforms.

4. Lower limb arterial – CFA, PFA, SFA origin, mid and distal unless diseased and then demonstrate stenosis with waveforms. Popliteal and TPT. Waveforms at ankle from PTA, ATA and PerA if visualised.

5. Lower limb venous DVT-

- a. Right/left leg - CFV including Valsalva, PFV, SFV origin and distal, Popliteal. Only take image in the calf if DVT identified or differential diagnosis e.g. Muscle tear, Baker's cyst, superficial oedema or thrombo-phlebitis. Need to record images with measurements of abnormal masses such as enlarged lymph nodes, Bakers cysts, muscle tears. If required to demonstrate occlusive vein or compressibility use dual image function to show venous compression.

6. Lower limb venous Varicose vein –

- a. Right and left legs
 - i. Follow deep venous protocol as above
 - ii. Superficial junctions demonstrating competence/incompetence
 - iii. Sections of LSV in thigh and calf demonstrating competence/incompetence and TS images showing diameters for VNUS suitability if required



- iv. Section of SSV in mid calf demonstrating competence/incompetence and TS images showing diameters for VNUS suitability if required

7. Vein mapping for bypass conduit:

a. For LSV -

If suitable vein: One image showing CFV/SFJ and competency. B-mode TS images of proximal, mid and distal thigh with diameter measurement. Proximal, mid and distal calf with diameters.

- b. If Unsuitable vein: one image showing reason for non-suitability eg. Varicose, superficial thrombo-phlebitis.

c. For SSV-

If suitable vein and patent junction: One image showing PopV/SPJ and competency. B-mode TS images of proximal, mid and distal calf with diameter measurement.

8. Transvaginal Duplex Ultrasound for pelvic vein reflux –

- a. Bilateral internal iliac vein (IIV) and bilateral ovarian vein (OV) in sagittal view. Annotate images to include: vessel diameter, reflux time during/release of Valsalva. Annotate scan position (supine/ semi-standing). If post-embolisation annotate images showing coils in situ.

9. Aorto-iliac – aorta in LS and TS demonstrating normal or aneurysmal pathology. Aortic bifurcation and CIA and EIA where possible with colour and waveforms. CEUS and 3D – aneurysm in LS, TS demonstrating sac, endoleak

A tortuous Abdominal Aorta can lead to measurement errors depending on the angle of the Abdominal Aorta and caliper placement. Oblique measurements of the Abdominal Aorta may cause overestimation of the diameter.

Care should be taken when measuring the Aorta to ensure that the diameter is not taken at an oblique angle as per IVS training. The probe should be adjusted by the Vascular Scientist to ensure the maximum diameter of the Aorta is taken perpendicular to blood flow. Vascular Scientists can 'heel -toe' the probe to a more accurate angle to ensure the true AP measurement is achieved. The entire length of the Abdominal Aorta should also be scanned to



identify any vessel tortuosity or the presence of fusiform or saccular aneurysms.

10. Visceral assessment –

- a. Proximal abdominal aorta LS with waveform demonstrating any disease.
- b. Coeliac axis (where possible) with colour. demonstrating any disease
- c. Hepatic and splenic arteries – colourflow and spectral waveforms demonstrating any disease
- d. SMA- Colour image and with spectral waveform, SMA diameter, demonstrating any disease
- e. IMA – if identified, colour image and spectral waveforms, demonstrating any disease

11. Upper limb arterial – VA direction, subclavian, axillary, brachial, brachial bifurcation, radial and ulnar waveforms at wrist with colour and waveforms.

12. Upper limb venous – IJV, subclavian vein, axillary vein, brachial veins – waveforms to demonstrate phasicity. Only take images of basilic and cephalic veins if there is evidence of superficial venous pathology/thrombo-phlebitis.

13. Fistula – radio-cephalic – subclavian and waveform, brachial and waveform, radial artery prox and distal to fistula with waveform. The anastomosis with velocities and diameter. Fistula image with colour, outflow/ cephalic vein with three volume flow measurements and vessel diameter. Record on image location of volume flow and diameter in relation to elbow crease.

14. GCA – Bilateral Superficial Temporal artery, frontal and parietal branches, and axillary arteries with colour flow image in TS and LS. IMT measurements of bilateral Superficial Temporal artery, frontal and parietal branches, and axillary arteries in TS with colour flow. Spectral waveforms only if stenosis present. In the presence of hypoechoic halo, TS and LS with colour flow Doppler including IMT measurement (US machine measures in cm however in the scan report should be reported in mm).

References:

1. RCR position statement on the Records Management Code of Practice for Health and social care 2016: application of the Code to radiology records retention protocols December 2017



https://www.rcr.ac.uk/sites/default/files/position_statement_records_management_code_practice.pdf

2. Guidelines and standards for implementation of new PACS/RIS solutions in the UK (2011) The Royal College of Radiologists.BFCR(11)4
<https://www.rcr.ac.uk/publication/guidelines-and-standards-implementation-newpacsris-solutions-uk>



Protocols for non-invasive and minimally invasive assessments

Independent Vascular Services Ltd

Change History:

Version Number	Reason for Change	CRN	Effective Date
01	New issue	n/a	01/01/2013
02	Change layout		01/03/2013
03	Additions of CEUS/HAVS protocols	103	26/02/2014
04	Additions to Carotid/venous protocols	107	25/07/2014
05	Amendment to Macc rescan protocol	112	06/11/2014
06	Amendments to toe pressures	118	19/03/2015
07	Addition of ECA criteria	125	27/04/2015
08	Addition of Warrington DVT protocol	126	25/06/2015
09	Change in venous protocol	155	11/03/2016
10	Change to abdominal protocols	171	4/10/2016
11	Change to lower limb venous protocol content/layout	172	4/10/2016
12	Addition of MALS protocol	173	4/10/2016
13	Addition of PAES protocol	174	4/10/2016
14	Addition of upper limb venous protocol	175	3/11/2016
15	Addition to popliteal entrapment protocol	183	11/03/2017
16	Addition SM Beacon protocol, removal Macclesfield rescan policy	185	24/04/2017
17	Addition of UHSM specific protocols	195	20/10/2017
18	Addition of Stepping Hill DVT protocols/local CIA aneurysm screening protocols	213	30/01/2018
19	Lower limb arterial velocity ratio protocol	225	27/02/2018
20	AAA ML measurement amendment	238	20/07/2018
21	Units of measurement amendment	242	11/02/2019
22	NM DVT rescan change	259	15/01/2020
23	AAA amendment	262	06/02/2020
24	Carotid velocity change/Reduced term clarification	279	17/02/2021
25	Iliac DVT scanning rationale	286	09/08/2021



26	Removal of AVP	291	26/01/2023
27	Thigh venous reflux – dependent angle	296	29/01/2023
28	GCA protocol/CEUS reference	306	01/02/2023

Prepared By	Date	Approved by	Date
T.Gall	01/01/2013	R.Pole	01/01/2013

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CL1.1

1. Patient Identification, preparation and care

- a) Notes and/or referral letter should be read prior to approaching patient to confirm examination type.
- b) Patient should be identified in the waiting area by name alone.
- c) Patient should be directed to the examination room with aid from the clinical vascular scientist, CVS, (if necessary). If patient is a child or vulnerable adult then always scan in the presence of a parent/carer.
- d) Once in the examination room, the CVS should identify themselves, and then the patient details should be confirmed by name, date of birth, and address. These details should be added to the examination sheet.
- e) Patient should be asked what symptoms they have been experiencing or 'do they know why they are here?'
- f) CVS should explain briefly what they intend to do, gain verbal informed consent and put the patient at ease. For examination using contrast agents written consent should be obtained.
- g) If consent not obtained patient should be directed back to ward/physician or A&E etc. Report on database patient attended but refused scan and any details surrounding visit. Log refusal on incident log on shared drive.
- h) Patient is then asked to remove any necessary clothing or jewellery (with help of CVS if required). Explain that the gel is hypo-allergenic and water soluble so will not stain clothes.
- i) CVS should assist the patient on to the examination couch and ensure patient is comfortable, (do not lift patients – mandatory manual handling instruction).
- j) Examination is performed as per relevant protocol.
- k) Patient should be assisted off the couch once they feel able, (do not lift patients). CVS should warn the patient that they may feel dizzy or lightheaded if they sit up too quickly.
- l) CVS should explain where the results will be forwarded and who will explain the results. CVS could estimate a timeframe for the results to reach the referring clinician. CVS should not explain the outcome of the examination unless specifically directed by referring clinician.
- m) CVS needs to arrange equipment to ensure maximum possible comfort and to reduce the likelihood of musculo-skeletal injury.



- n) If there is an unexpected diagnosis that requires urgent clinical management then staff should understand the importance of contacting the vascular team on-call and trying to get the patient an urgent vascular opinion. See 'Red Flag policy' on shared drive.
- o) If you require to mark the skin, please use the sterile disposal pens and tape measures available. Do not use normal pens to mark the leg – this is a cross infection risk.
- p) It is standard policy to issue a report as soon as possible after the completion of the report. Reports from all patients are issued either in an electronic or paper format within 8 hours of completion of the vascular ultrasound report. If inpatient or Red Flag patient the vascular ultrasound report is placed in the notes or placed electronically on the host Trust wide reporting system within 10 minutes. If a Red Flag patient then the report will be immediately faxed to the consultant with a follow up phone call to ensure that it has arrived.

CL1.2

2. Basic guidelines

Basic colourflow set-up

Whilst visualising a vessel optimum colourflow is described as wall-to-wall filling of the vessel without colourflow scatter outside the vessel wall. This can be achieved by selecting the appropriate default setting, steering the colourflow box and adjusting the colourflow gain, wall filter and colourflow velocity functions. In addition, the colour velocity range needs to be set to allow slight aliasing.

Velocity measurements

The Doppler sample volume is placed in the area of fastest flow (as indicated by the colourflow map). The angle correct line should be set at 60 degrees and should lie parallel to the blood flow achieved by 'tip-toe' the transducer movement. If transducer movement cannot achieve parallel flow then the angle correct line should be altered to lie parallel with the blood flow, (but angle should be less than 60 degrees).

Safety of Ultrasound and ALARA Principle

There are two documented potential mechanisms for ultrasound to cause harm to patients. These are heating of soft tissue and cavitation^{2,4,12}.

Both of these bio-effects are related to output intensity and exposure time to ultrasound. The potential for thermal heating is displayed as the TI or thermal index and the potential for cavitation as MI or mechanical index.

There are three options for TI, being TIS – thermal index in soft tissue, TIB – thermal index with focus close to bone and TIC for trans-cranial imaging applications².

There are no documented index thresholds for the different modality and control settings. The principle universally accepted by all ultrasound practitioners is the ALARA or 'As low as reasonably achievable' principle. This means that the total output energy applied to the patient must be kept as low as possible by reducing output power to its lowest level without compromising on image quality and by limiting exposure time without rushing a scan¹².

It is the clinical vascular scientists' responsibility to control the total energy emitted to the patient and must reconcile exposure time with diagnostic image quality¹².



CL1.3

3. Extra-cranial carotid/ brachio-cephalic/ subclavian/ vertebral assessment

Probe types – 12 - 3MHz

Measurements – Velocities in centimetres per second (cm/s), diameter (transverse; anterior-posterior, medial-lateral) in centimetres (cm) (if dilated/pre-op), length of disease (longitudinal) in cm.

Patient positioning and scanning approach – patients can be scanned supine or in a sitting position. A supine approach with the vascular scientist sat behind the patient's head allows easy access to the neck and reduces the risk of RSI (repetitive strain injury) as the operator can rest their arm on the pillow or on the head of couch. The patient extends the neck and turns the head in the opposite direction to the side being assessed. Both sides of the neck are always assessed¹.

The carotid arteries can be viewed from a lateral or antero-lateral approach using the sternocleidomastoid muscle as an acoustic window².

B-mode assessment

Intimal B-mode assessment is performed to achieve an accurate picture of the anatomy and identify the location of the carotid bifurcation as well as the presence of any plaque morphology^{2,3}.

Using B-mode, the common carotid artery (CCA) should be imaged in cross-section (transverse plane) and traced proximally to the clavicle until the subclavian artery is visualised. The distal brachio-cephalic artery may be visualised on the right side of the neck. On the left side, the origin of the CCA and subclavian arteries will not be visualised due to depth. The CCA should then be scanned along its length to the level of the bifurcation where the internal carotid artery (ICA) and external carotid artery (ECA) are visualised from their origins as far distal as possible.

The same method should then be repeated in longitudinal plane².

Colourflow assessment

Using the Colourflow modality, the CCA is scanned longitudinally where it is traced from the proximal section at the level of the clavicle to the distal section where the bifurcation, ICA and ECA are visualised as far distal as possible.

Colour should be used to identify ECA branches, filling defects, occlusion and velocity changes/ turbulence, although diagnosis should not be made using colour Doppler alone^{2,3}.

Grading plaque morphology – greyscale echogenicity

Switching to the greyscale imaging mode, a note can be made of the site, type and extent of plaque morphology.

The subclavian is visualised along its length in longitudinal section. The CCA, ICA and ECA are then viewed in cross-section and longitudinally. As soft plaque has the same echogenicity as blood, colourflow is the best modality for identification.



Soft plaque – associated with higher lipid content or thrombus. May have an anechoic or echolucent appearance similar to that of blood/fluid^{2,3}

Mixed plaque – variable/ heterogenous appearance of mixed or random echoes with some echogenic and some echolucent areas^{2,3}.

Dense plaque – homogenous appearance of bright white echoes⁴.

Calcified plaque – acoustic shadowing cast from the hardened plaque^{2,3}.

Irregular – broken or irregular luminal surface but not generally an indication of ulceration¹⁶.

Ulcerative – an area of mixed plaque forming a ‘crater’ of at least 2mm depth. May be seen in cross-section as a ‘hook’ of mixed plaque surrounding soft plaque, or with blood visibly swirling within the crater^{2,3}.

Doppler assessment

In the absence of significant disease, peak systolic velocity (PSV) measurements are taken from the CCA (1-2cm proximal to bifurcation)^{1, 2}, ICA and ECA. If the peak velocities are raised above 1.3m/s then the end-diastolic velocity (EDV) is also measured.

If significant plaques have been identified using B-mode and colour flow Doppler then further spectral Doppler samples are taken to investigate velocity increases and analyse the degree of stenosis in particular vessel. Stenosis in the ICA is graded using the criteria explained below. Atypical waveform profiles should also be noted^{2, 3}.

In cross-section, the CCA is traced proximal towards the clavicle and the transducer is angled beneath the clavicle until the subclavian artery is viewed in longitudinal section. The subclavian is traced as far proximal and distal as possible making note of areas of turbulence or narrowing. The PSV is measured using Doppler ultrasound. A second Doppler reading is taken as far distal as possible and the waveform characteristics are recorded (e.g. triphasic, biphasic, monophasic, turbulent, damped etc.).

Velocities in kinked arteries are less reliable as vessel tortuosity can raise velocities¹⁷. Care must be taken to ensure that the angle is correct to blood flow rather than the vessel³. In reporting, it will be stated ‘peak velocities indicate x% - y% stenosis but no plaque morphology noted.

Grading degree of carotid stenosis

Normal Velocities:

ICA:

- average (avg) PSV = 54 – 88cm/s (distal to bulb)⁴
- avg PSV = 74cm/s, avg EDV = 29cm/s (distal to bulb)⁵
- velocity slightly elevated if patient hypertensive⁶
- maximum PSV noted in normal = 115cm/s⁷



ECA:

- avg PSV \approx 77cm/s (normally <115cm/s)⁴
- avg PSV = 84cm/s, avg EDV = 16cm/s⁵
- ECA velocities can be elevated by an ipsilateral ICA occlusion⁴

CCA:

- avg PSV = 60 – 100cm/s⁸
- avg PSV = 108 +/- 18 cm/s (mean +/-S.D.)⁹
- avg PSV = 78-108 cm/s⁷
- avg PSV = 99cm/s, avg EDV = 27cm/s⁵
- on average, PSV in L CCA exceeds PSV in R CCA by 5cm/s⁹
- velocity slightly elevated if patient hypertensive⁶

Carotid Criteria

Diameter Stenosis	Morphology	ICA PSV (cm/s)	ICA EDV (cm/s)	PSVica/PSVcca	St Mary's ratio
<25%	Normal	<125	<40		
<30%	Intimal Thickening	<125	<40		
<30%	Plaque	<125	<40		
<40%	Plaque	<125	<40		
<50%	Plaque	<125	<40	<2	<8
50-59%	Plaque	>125	<40	<3.2	8.0-10
60-69%	Plaque	>125	40-110	3.2-4.0	11-13
70-79%	Plaque	>230	110-140	>4.0	14-21
80-89%	Plaque	>230	>140	>4.0	22-29
90-95%	Plaque	>400	>140	>5.0	>30
96-99%	Plaque	Trickle flow			Variable
100%	Plaque	Absence of flow			N/A

Sidhu and Allan. Ultrasound Assessment of Internal Carotid Artery Stenosis. Clinical Radiology, (1997) 52, 654-658. (Developed using data from Moneta et al. 1993, 1995). CP Oates et al. Joint recommendations for Reporting Carotid Ultrasound Investigations in the UK. EurJ Vasc Endovasc Surg (2008) 20, 1-11.

Criteria are only reliable for internal carotid artery stenosis³.

ICA peak systolic velocities are less reliable in the presence of CCA disease and ratios should be used. The use of the ICA: CCA PSV ratio normalises ICA PSV measurements^{2,3}.

Elevated velocities can be produced in the CCA, ICA¹⁹ and ECA in the presence of contralateral CCA or ICA stenosis or occlusion.

A significant proximal (CCA origin or brachio-cephalic) ipsilateral stenosis can reduce velocities in the CCA, ICA and ECA.

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Aortic stenosis can reduce the velocities in the CCA only.
Peak systolic velocities from large carotid bulbs may be unreliable, estimate degree of stenosis using grey scale and diameter/area reduction measurement.

Doppler Waveforms:

1. CCA waveform has a low-resistance pattern (most of the CCA flow goes to the brain). Note that a small amount of post systolic flow reversal (giving rise to a triphasic waveform) is normal; reversal of flow evident for more than 50% of the duration of diastole should be regarded as abnormal (see point 5 below)¹⁰.
2. Normal ICA waveform has low-resistance pattern (all of the ICA flow goes to brain)¹⁸.
3. Normal ECA waveform has a high-resistance pattern (vessel supplies a high resistance vascular bed). Note the prominent diastolic notch, which represents closure of the aortic valve and the onset of diastole¹⁰.
4. Severe proximal stenosis (innominate artery, CCA origin, aortic valve) produces a damped waveform ("tardus-parvus", where tardus infers the pulse is slow to rise and fall and parvus infers a small pulse.)^{4, 8}. Essentially, the acceleration time to systole is increased, hence the slope of the systolic upstroke is reduced, and there is blunting and smoothing of the sharp peak representing a reduction in waveform pulsatility⁹. This effect is usually most prominent in the CCA, but is also sometimes seen in the ICA & ECA. Note that in the case of aortic valve disease or diminished cardiac output, damping is symmetrical (seen in both CCAs)⁴.
5. Severe aortic incompetence with or without the presence of significant aortic stenosis often produces either a bisferious (two systolic peaks, well separated from the diastolic notch, with the second peak being the same height as or higher than the first) waveform¹⁰, or persistent reverse diastolic flow in the CCA, or both. Note that these effects are not usually seen in the ICA, but are evident in both the CCA & ECA.
6. Significant stenosis or occlusion of the distal CCA or the ICA causes a high-resistance ipsilateral CCA waveform; reverse flow is evident and often there is complete loss of end diastolic flow. Note that significant ECA disease does not usually impact on the CCA waveform due to its relatively low flow volume⁴.

External Carotid Artery Assessment

From searching the literature (pubmed, medline, science direct, quest) there is no evidence of a radiologically validated method for grading ECA disease using a velocity criteria.

There is normally little requirement for the grading of ECA disease due to its highly branched vascular network and non-cerebral involvement^{13,15}. In cases where a patient experiences cerebral or ocular symptoms in the presence of ipsilateral ICA occlusion it may be useful to grade and characterise ECA disease as a possible cause of emboli and transient ischaemic attack (TIA). There is much published evidence extolling the



benefit of surgical or radiological intervention for the treatment of ECA disease where there is ipsilateral ICA occlusion and a thorough examination of disease is important in these cases^{13,14,15}.

At present staff use a visual estimation and/or use of electronic callipers to measure degree and extent of stenotic disease.

In the presence of an ICA occlusion, electronic callipers should be used in the transverse and longitudinal planes to measure degree of ECA stenosis. Length of stenosis, plaque characterisation and degree of turbulence should also be recorded in the report.

Vertebral artery assessment

The vertebral artery (VA) can be viewed if the transducer is angled posterior. The flow direction should be the same as the carotid flow direction and is checked using the colourflow, **but more** importantly the Doppler sample volume. Vertebral flow is graded as orthograde, oscillatory (i.e. reversed in either systole or diastole alone) or retrograde^{2,3}. If no colourflow is identified within the vessel lumen – use spectral or power Doppler to investigate as it is more sensitive than colourflow⁴.

NORMAL VELOCITIES:

- avg PSV = 20-40 cm/s^{2,3}
- PSV < 10 cm/s should be regarded as potentially abnormal⁴
- Higher velocities may be normal in the dominant VA of an asymmetric pair.^{2,3}
- Higher velocities may be normal with contralateral VA occlusion.^{2,3}
-

DOPPLER WAVEFORMS:

1. Normal VA waveform has a low-resistance pattern (supplying the brain), with cephalad flow throughout the cycle^{2,4}.
2. If the VA has a high-resistance, antegrade (cephalic) flow pattern, there is probably a significant obstruction distal to the site of examination. (The second most common site of VA atheroma is intracranially, just beyond the C1 arch)³.
3. Severe proximal stenosis produces a damped waveform; note that the most common site of VA atheroma is the VA origin, although this can be difficult to image as it originates from the posterior aspect of the subclavian artery³.
4. Subclavian artery origin stenosis can have varying effects on the VA waveform shape and the direction of flow, dependent on the degree of stenosis and the presence of other collateral pathways.



Pre-operative carotid assessment.

Staff must follow additional criteria when performing a pre-operative scan for carotid endarterectomy.

1. Length of disease from the bifurcation, into the ICA, must be documented.
2. Bifurcation needs to be marked on the skin surface – the image of the bifurcation is obtained then the probe is moved until the bifurcation is just off the leading edge of the probe, marks are made on the skin surface in transverse and longitudinal section. Where these lines transverse is the position of the bifurcation and an arrow should be drawn to mark the tip.
3. Take a picture of the disease and keep with our hardcopy.
4. Mark MCA signal – see TCD section

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Reason	Visual symptom				
Outcome	Occlusion				
Right					
		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.99	0.23	< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Bifurcation					< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			0.46	0.16	< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 0.5		Pk ICA/End CCA = 2.0	
External			1.20		50% - 59%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left					
		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.77		> 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Bifurcation					< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			*		= 100%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 0.0			
External			1.38		< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods. If marked * ALWAYS read full notes.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

RIGHT

Mixed, dense and calcified plaques identified in the right internal carotid artery, forming a less than 50% stenosis.

Mixed, dense and calcified plaques identified in the right external carotid artery, forming a less than 50-59% stenosis.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:32 pm

Checked by

Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

LEFT

The left internal carotid artery appears occluded with no colour, spectral or power Doppler signal obtained within the vessel lumen.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

SUGGEST URGENT VASCULAR OPINION

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:32 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	TIA				
Outcome	Calcified, Mild disease				
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.93	0.18	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			0.85	0.20	< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 0.9		Pk ICA/End CCA = 4.7	
External			0.97		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.82	0.14	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			1.16	0.25	< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 1.4		Pk ICA/End CCA = 8.3	
External			1.24		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX ASSESSMENT

RIGHT

Mixed, dense and calcified plaques identified in the right internal carotid artery, forming a less than 50% stenosis.

LEFT

Mixed, dense and calcified plaques identified in the left internal carotid artery, forming a less than 50%

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:33 pm

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stenosis.

The right and left vertebral arteries appear patent with orthograde flow.

The right and left subclavian arteries appear widely patent with good triphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:33 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Routine				
Outcome	Widely patent				
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.12	0.41	< 25%
Plaque	Normal				
Disease length from BIF					< 25%
Bifurcation					
Plaque	Normal				
Disease length from BIF					< 25%
Internal			1.08	0.45	< 25%
Plaque	Normal				
Disease length from BIF		Pk ICA/Pk CCA = 1.0		Pk ICA/End CCA = 2.6	< 25%
External			1.41		< 25%
Plaque	Normal				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					< 0%
Plaque					
Disease length from BIF					< 0%
Bifurcation					
Plaque					
Disease length from BIF					< 25%
Internal			0.76	0.34	< 25%
Plaque	Normal				
Disease length from BIF					
External			0.97		< 25%
Plaque	Normal				
Disease length from BIF					
Vertebral	Not Identified				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

*Challenging examination due to patient movement

The right internal carotid artery appears widely patent with no evidence of any plaque morphology, intimal dissection or other abnormality identified.

?Aberrant anatomy identified on the left side with the bifurcation not identified ? low ICA origin or ?high bifurcation. All visualised vessels, however, do appear widely patent with no evidence of any plaque morphology, intimal dissection or other abnormality identified.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:34 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Right vertebral open and orthograde. Left vertebral not identified ?aberrant anatomy
Right and left subclavian arteries appear widely patent with triphasic waveforms.

Suggest alternative imaging, if appropriate

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:34 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Routine				
Outcome	Stenosis moderate, Stenosis severe, Obscured, Calcified				
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.02	0.15	< 40%
Plaque	Dense Mixed				
Disease length from BIF					
Bifurcation					< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			2.80	0.54	70% - 95%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 2.7		Pk ICA/End CCA = 18.7	
External			0.59		< 40%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.04	0.15	< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Bifurcation					< 40%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			1.69	0.34	50% - 95%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 1.6		Pk ICA/End CCA = 11.3	
External			0.92		< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

*Challenging assessment due to vessel motility (heavy breathing) and heavy calcified disease causing acoustic shadowing - poor images

RIGHT

The right internal carotid artery was obscured due to acoustic shadowing for ~1.00cm in length. Raised velocities identified just distal to this obscured region are indicative of a 70-79% stenosis, however, unable to rule out more significant stenosis in obscured region. Mixed, dense and calcified plaques identified where

Assessed by Emily Davies, MCVS

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seen.

LEFT

The left internal carotid artery was obscured due to acoustic shadowing for ~0.66cm in length. Raised velocities identified just distal to this obscured region are indicative of a 50-59% stenosis, however, unable to rule out more significant stenosis in obscured region. Mixed, dense and calcified plaques identified where seen.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Suggest urgent vascular opinion

Assessed by Emily Davies, MCVS

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	TIA clinic				
Outcome	Stenosis moderate				
<hr/>					
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.63	0.18	< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Bifurcation					< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			1.00	0.35	50% - 59%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 1.6		Pk ICA/End CCA = 5.6	
External			1.26		< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
<hr/>					
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.62	0.24	< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Bifurcation					< 40%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			0.87	0.30	< 40%
Plaque	Dense Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 1.4		Pk ICA/End CCA = 3.6	
External			0.98		< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX ASSESSMENT

RIGHT:

No raised velocities identified in the internal carotid artery, however, mixed, dense and calcified plaques appear to form a 50-59% stenosis based on grey-scale imaging. Stenosis length ~1.34cm in length. Distal ICA is patent.

LEFT:

Assessed by Emily Davies, MCVS

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Mixed and dense plaques identified in the left internal carotid artery, forming a less than 40% stenosis.

The right and left vertebral arteries appear patent with orthograde flow.

The right and left subclavian arteries appear widely patent with good triphasic waveforms.

SUGGEST VASCULAR SURGICAL OPINION

Suggest alternative imaging

Assessed by Emily Davies, MCVS

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Stroke				
Outcome	Mild disease				
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.70	0.19	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 40%
Plaque	Dense Mixed				
Disease length from BIF					
Internal			1.00	0.16	< 40%
Plaque	Dense Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 0.6		Pk ICA/End CCA = 5.3	
External			1.12		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.53	0.16	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Internal			1.21	0.12	< 40%
Plaque	Dense Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 0.8		Pk ICA/End CCA = 7.6	
External			1.98		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

Mixed and dense plaques identified in the right and left internal carotid artery, forming a less than 40% stenosis bilaterally.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:36 pm

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Reason	Stroke				
Outcome	Mild disease				
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.79		< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Internal			0.71	0.11	< 40%
Plaque	Dense Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 0.9			
External			1.25		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.73		< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Bifurcation					< 40%
Plaque	Dense Mixed				
Disease length from BIF					
Internal			0.65	0.16	< 50%
Plaque	Dense Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 0.9			
External			0.90		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX ASSESSMENT

*Patient scanned in chair due to limited mobility

RIGHT:

Mixed and dense plaques identified in the right internal carotid artery, forming a less than 40% stenosis.

LEFT:

Mixed and dense plaques identified in the left internal carotid artery, forming a less than 50% stenosis.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:38 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

The right and left vertebral arteries appear patent with orthograde flow.
The right and left subclavian arteries appear widely patent with good triphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:38 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Stroke				
Outcome	Stenosis moderate, Obscured, Calcified				
<hr/>					
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.80	0.22	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 40%
Plaque	Dense Mixed				
Disease length from BIF					
Internal			0.78	0.24	< 40%
Plaque	Dense Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 1.0		Pk ICA/End CCA = 3.5	
External			0.91		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
<hr/>					
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.78	0.14	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					50% - 95%
Plaque	Calcified				
Disease length from BIF					
Internal			1.22	0.34	< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 1.6		Pk ICA/End CCA = 8.7	
External			3.70		50% - 59%
Plaque					
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

RIGHT

Mixed and dense plaques identified in the right internal carotid artery, forming a less than 40% stenosis.

LEFT

The left carotid bifurcation is obscured due to calcified plaques forming acoustic shadowing, however, where seen distal to this (prox ICA and prox ECA) velocities are indicative of a significant stenosis.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:40 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Mixed, dense and calcified plaques identified in the left internal carotid artery, forming a less than 50% stenosis.

Mixed, dense and calcified plaques identified in the left external carotid artery, forming a 50-59% stenosis.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Suggest vascular opinion if appropriate

Suggest alternative imaging

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:40 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Stroke				
Outcome	Mild disease				
<hr/>					
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.76	0.22	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Mixed				
Disease length from BIF					
Internal			0.52	0.23	< 30%
Plaque	Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 0.7		Pk ICA/End CCA = 2.4	
External			1.19		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
<hr/>					
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.01	0.20	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Mixed				
Disease length from BIF					
Internal			0.90	0.26	< 30%
Plaque	Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 0.9		Pk ICA/End CCA = 4.5	
External			1.15		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX ASSESSMENT

*Irregular heart rate noted

*Challenging assessment due to motile vessels and patient limited mobility - poor images

RIGHT:

Mixed plaques identified in the right internal carotid artery, forming a less than 30% stenosis.

LEFT:

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:40 pm

Checked by

Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Mixed plaques identified in the right internal carotid artery, forming a less than 30% stenosis.

The right and left vertebral arteries appear patent with orthograde flow.

The right and left subclavian arteries appear widely patent with good triphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:40 pm

Checked by _____

Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason TIA clinic
Outcome Mild disease

Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.74	0.17	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Mixed				
Disease length from BIF					
Internal			0.64	0.20	< 30%
Plaque	Mixed				
Disease length from BIF					
		Pk ICA/Pk CCA = 0.9	Pk ICA/End CCA = 3.8		
External			0.95		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.80	0.22	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Mixed				
Disease length from BIF					
Internal			0.57	0.23	< 30%
Plaque	Mixed				
Disease length from BIF					
		Pk ICA/Pk CCA = 0.7	Pk ICA/End CCA = 2.6		
External			1.00		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

Mixed plaques identified in the right and left internal carotid arteries, forming a less than 30% stenosis bilaterally.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:41 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Stroke				
Outcome	Mild disease				
<hr/>					
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Mixed		1.04	0.20	< 30%
Disease length from BIF					
Bifurcation					
Plaque	Mixed				< 30%
Disease length from BIF					
Internal					
Plaque	Mixed		0.79	0.26	< 30%
Disease length from BIF					
		Pk ICA/Pk CCA = 0.8		Pk ICA/End CCA = 4.0	
External					
Plaque	Mixed		0.79		< 30%
Disease length from BIF					
Vertebral		Open Orthograde			
Subclavian		No Turbulence	Good signal	Triphasic	Widely Patent
<hr/>					
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Mixed		1.02	0.30	< 30%
Disease length from BIF					
Bifurcation					
Plaque	Mixed				< 30%
Disease length from BIF					
Internal					
Plaque	Mixed		0.65	0.23	< 30%
Disease length from BIF					
		Pk ICA/Pk CCA = 0.6		Pk ICA/End CCA = 2.2	
External					
Plaque	Mixed		1.39		< 30%
Disease length from BIF					
Vertebral		Open Orthograde			
Subclavian		No Turbulence	Good signal	Triphasic	Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

Mixed plaques identified in the right and left internal carotid artery, forming a less than 30% stenosis.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:41 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	TIA clinic				
Outcome	Mild disease				
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Mixed		1.01	0.20	< 30%
Disease length from BIF					
Bifurcation					
Plaque	Intimal Thickening				< 30%
Disease length from BIF					
Internal					
Plaque	Intimal Thickening		0.48	0.14	< 30%
Disease length from BIF					
		Pk ICA/Pk CCA = 0.5	Pk ICA/End CCA = 2.4		
External					
Plaque	Normal		0.73		< 25%
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Mixed		1.22	0.26	< 30%
Disease length from BIF					
Bifurcation					
Plaque	Mixed				< 30%
Disease length from BIF					
Internal					
Plaque	Dense Mixed		0.69	0.16	< 30%
Disease length from BIF					
		Pk ICA/Pk CCA = 0.6	Pk ICA/End CCA = 2.7		
External					
Plaque	Mixed		0.62		< 30%
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

Intimal thickening identified in the right internal carotid arteries, forming a less than 30% reduction in luminal diameter

Minimal mixed and dense plaques identified in the left internal carotid artery, forming a less than 30% stenosis

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with triphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:42 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Pulsatile Tinnitus				
Outcome	Widely patent				
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.04	0.27	< 25%
Plaque	Normal				
Disease length from BIF					
Bifurcation					< 25%
Plaque	Normal				
Disease length from BIF					
Internal			0.91	0.28	< 25%
Plaque	Normal				
Disease length from BIF					
		Pk ICA/Pk CCA = 0.9		Pk ICA/End CCA = 3.4	
External			0.66		< 25%
Plaque	Normal				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.07	0.32	< 25%
Plaque	Normal				
Disease length from BIF					
Bifurcation					< 25%
Plaque	Normal				
Disease length from BIF					
Internal			0.73	0.35	< 25%
Plaque	Normal				
Disease length from BIF					
		Pk ICA/Pk CCA = 0.7		Pk ICA/End CCA = 2.3	
External			0.72		< 25%
Plaque	Normal				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

The right and left internal carotid arteries appear widely patent with no evidence of any plaque morphology, intimal dissection or other abnormality identified.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:43 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Stroke			
Outcome	Calcified, Mild disease			
Right	Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common		0.84	0.19	< 40%
Plaque	Dense Mixed			
Disease length from BIF				
Bifurcation				< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Internal		1.17	0.23	< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
	Pk ICA/Pk CCA = 1.4		Pk ICA/End CCA = 6.2	
External		1.24		< 40%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Vertebral	Open Orthograde			
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent
Left	Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common		0.95	0.28	< 40%
Plaque	Dense Mixed			
Disease length from BIF				
Bifurcation				< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Internal		1.03	0.26	< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
	Pk ICA/Pk CCA = 1.1		Pk ICA/End CCA = 3.7	
External		1.00		< 40%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Vertebral	Open Orthograde			
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

*Irregular heart rate noted

Mixed, dense and calcified plaques identified in the right and left internal carotid arteries, forming a less than 50% stenosis bilaterally. The right and left internal carotid arteries were both highly tortuous.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:44 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Stroke				
Outcome	Mild disease				
<hr/>					
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Mixed		1.31	0.21	< 30%
Disease length from BIF					
Bifurcation					< 30%
Plaque	Mixed				
Disease length from BIF					
Internal			0.84	0.23	< 40%
Plaque	Mixed				
Disease length from BIF					
		Pk ICA/Pk CCA = 0.6		Pk ICA/End CCA = 4.0	
External			1.88		< 40%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent	
<hr/>					
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Mixed		1.28	0.28	< 30%
Disease length from BIF					
Bifurcation					< 40%
Plaque	Mixed				
Disease length from BIF					
Internal			0.85	0.25	< 40%
Plaque	Mixed				
Disease length from BIF					
		Pk ICA/Pk CCA = 0.7		Pk ICA/End CCA = 3.0	
External			1.90		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent	

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

Mixed plaques identified in the right and left internal carotid artery, forming a less than 40% stenosis bilaterally.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:44 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Routine				
Outcome	Mild disease				
<hr/>					
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Mixed		0.95	0.20	< 40%
Disease length from BIF					
Bifurcation					
Plaque	Dense Mixed				< 40%
Disease length from BIF					
Internal					
Plaque	Mixed		0.53	0.17	< 30%
Disease length from BIF					
		Pk ICA/Pk CCA = 0.6		Pk ICA/End CCA = 2.7	
External					
Plaque	Intimal Thickening		0.87		< 30%
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
<hr/>					
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Mixed		0.76	0.13	< 30%
Disease length from BIF					
Bifurcation					
Plaque	Mixed				< 40%
Disease length from BIF					
Internal					
Plaque			0.71	0.26	< 30%
Disease length from BIF					
		Pk ICA/Pk CCA = 0.9		Pk ICA/End CCA = 5.5	
External					
Plaque			0.56		< 30%
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX ASSESSMENT

RIGHT:

Mixed plaques identified in the right internal carotid artery, forming a less than 30% stenosis.

LEFT:

The left internal carotid artery was difficult to visualise due to depth and high bifurcation, however, mixed plaques forming a less than 30% stenosis identified where seen.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:45 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

The right and left vertebral arteries appear patent with orthograde flow.

The right and left subclavian arteries appear widely patent with good triphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:45 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Right					
Common			0.83	0.20	< 30%
Plaque	Mixed				
Disease length from BIF					< 30%
Bifurcation					
Plaque	Mixed				
Disease length from BIF					
Internal			0.83	0.27	< 30%
Plaque	Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 1.0		Pk ICA/End CCA = 4.2	
External			1.16		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.94	0.27	< 30%
Plaque	Mixed				
Disease length from BIF					< 30%
Bifurcation					
Plaque	Mixed				
Disease length from BIF					
Internal			0.69	0.17	< 30%
Plaque	Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 0.7		Pk ICA/End CCA = 2.6	
External			0.70		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

Mixed plaques identified in the right and left internal carotid artery, forming a less than 30% stenosis bilaterally.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:46 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Pulsatile Tinnitus				
Outcome	Mild disease				
<hr/>					
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.01	0.22	< 30%
Plaque	Intimal Thickening				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Intimal Thickening				
Disease length from BIF					
Internal			0.94	0.29	< 30%
Plaque	Intimal Thickening				
Disease length from BIF		Pk ICA/Pk CCA = 0.9		Pk ICA/End CCA = 4.3	
External			1.49		< 30%
Plaque	Intimal Thickening				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
<hr/>					
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.09	0.22	< 30%
Plaque	Intimal Thickening				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Mixed				
Disease length from BIF					
Internal			0.94	0.29	< 40%
Plaque	Dense Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 0.9		Pk ICA/End CCA = 4.3	
External			1.49		< 30%
Plaque	Intimal Thickening				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

Intimal thickening identified in the right internal carotid artery, forming a less than 30% reduction in luminal diameter.

Mixed and dense plaques identified in the left internal carotid artery, forming a less than 40% stenosis.

Right and left vertebrals open and orthograde.

Right and left subclavians appear widely patent with triphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:46 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Stroke				
Outcome	Mild disease				
<hr/>					
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
<hr/>					
Common					
Plaque	Mixed		0.56	0.07	< 30%
Disease length from BIF					
Bifurcation					
Plaque	Mixed				< 40%
Disease length from BIF					
Internal					
Plaque	Mixed		0.64	0.10	< 40%
Disease length from BIF					
		Pk ICA/Pk CCA = 1.1		Pk ICA/End CCA = 9.1	
External					
Plaque	Mixed		0.92		< 30%
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent	
<hr/>					
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
<hr/>					
Common					
Plaque	Mixed		0.72	0.18	< 30%
Disease length from BIF					
Bifurcation					
Plaque	Dense Mixed				< 40%
Disease length from BIF					
Internal					
Plaque	Dense Mixed		0.83	0.19	< 40%
Disease length from BIF					
		Pk ICA/Pk CCA = 1.2		Pk ICA/End CCA = 4.6	
External					
Plaque	Mixed		1.03		< 30%
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent	

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

Mixed plaques identified in the right internal carotid artery, forming a less than 40% stenosis.
Mixed and dense plaques identified in the left internal carotid artery, forming a less than 40% stenosis.
Right and left vertebrals open and orthograde.
Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:47 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	TIA clinic				
Outcome	Mild disease				
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.90	0.14	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 40%
Plaque	Dense Mixed				
Disease length from BIF					
Internal			0.95	0.18	< 30%
Plaque	Dense Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 1.1		Pk ICA/End CCA = 6.8	
External			0.86		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.83	0.20	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 40%
Plaque	Dense Mixed				
Disease length from BIF					
Internal			0.91	0.19	< 30%
Plaque	Dense Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 1.1		Pk ICA/End CCA = 4.6	
External			0.92		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX

Mixed plaques identified in the right and left internal carotid artery, forming a less than 30% stenosis bilaterally.

Right and left vertebrals open and orthograde.

Right and left subclavian arteries appear widely patent with tri/biphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:48 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	Stroke			
Outcome	Stenosis moderate, Calcified			
Right	Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common				
Plaque	Dense Mixed Calcified	0.76	0.09	< 50%
Disease length from BIF				
Bifurcation				60% - 69%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Internal		2.25	0.49	60% - 69%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
		Pk ICA/Pk CCA = 3.0	Pk ICA/End CCA = 25.0	
External		1.31		< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Vertebral	Open Orthograde			
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent
Left	Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common		0.87	0.15	< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Bifurcation				< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Internal		1.44	0.32	50% - 59%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
		Pk ICA/Pk CCA = 1.7	Pk ICA/End CCA = 9.6	
External		1.01		< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Vertebral	Open Orthograde			
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX ASSESSMENT

RIGHT:

Mixed, dense and calcified plaques identified in the right carotid bifurcation and internal carotid artery, forming a 60-69% stenosis. Stenosis length ~1.07cm. Distal ICA is patent.

LEFT:

Mixed, dense and calcified plaques identified in the left internal carotid artery, forming a 50-59% stenosis.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:49 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Stenosis length ~1.31cm. Distal ICA is patent.

The right and left vertebral arteries appear patent with orthograde flow.

The right and left subclavian arteries appear widely patent with good triphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:49 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

Reason	TIA clinic				
Outcome	Mild disease				
<hr/>					
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.64	0.14	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Internal			0.57	0.17	< 30%
Plaque	Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 0.9		Pk ICA/End CCA = 4.1	
External			0.84		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent
<hr/>					
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			0.61	0.16	< 30%
Plaque	Mixed				
Disease length from BIF					
Bifurcation					< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Internal			0.59	0.18	< 30%
Plaque	Mixed				
Disease length from BIF		Pk ICA/Pk CCA = 1.0		Pk ICA/End CCA = 3.7	
External			0.78		< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX ASSESSMENT

RIGHT

Mixed plaques identified in the right internal carotid artery, forming a less than 30% stenosis.

LEFT

Mixed plaques identified in the left internal carotid artery, forming a less than 30% stenosis.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:50 pm

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Please note, this is a technical report to be interpreted by a medical professional. If you are a patient reading the report and require further help, please discuss the report with the person who referred you for the examination.

The right and left vertebral arteries appear patent with orthograde flow.
The right and left subclavian arteries appear widely patent with good triphasic waveforms.

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:50 pm

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Reason	Stroke			
Outcome	Calcified, Mild disease, Irregular Heart Rate			
Right	Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common		0.34	0.11	< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Bifurcation				< 40%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Internal		0.42	0.17	< 30%
Plaque	Mixed			
Disease length from BIF		Pk ICA/Pk CCA = 1.2	Pk ICA/End CCA = 3.8	
External		0.28		< 30%
Plaque	Mixed			
Disease length from BIF				
Vertebral	Open Orthograde			
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent
Left	Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common		0.50	0.13	< 40%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Bifurcation				< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF				
Internal		0.48	0.26	< 50%
Plaque	Dense Mixed Calcified			
Disease length from BIF		Pk ICA/Pk CCA = 1.0	Pk ICA/End CCA = 3.7	
External		0.30		< 40%
Plaque	Dense Mixed			
Disease length from BIF				
Vertebral	Open Orthograde			
Subclavian	No Turbulence	Good signal	Triphasic	Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX ASSESSMENT

*Irregular heart rate and irregular waveforms identified ?cardiac source

RIGHT

Mixed plaques identified in the right internal carotid artery, forming a less than 30% stenosis.

LEFT

Left proximal internal carotid artery was difficult to visualise due to calcified disease, however, mixed, dense

Assessed by Emily Davies, MCVS

Printed on 29/07/2024 at 12:52 pm

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and calcified plaques identified where seen, forming a less than 50% stenosis.

The right and left vertebral arteries appear patent with orthograde flow.

The right and left subclavian arteries appear widely patent with good triphasic waveforms.

Suggest alternative imaging, if appropriate

Assessed by Emily Davies, MCVS

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Reason	Visual symptom				
Outcome	Calcified, Mild disease				
Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.00	0.19	< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Bifurcation					< 40%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			1.17	0.26	< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 1.2		Pk ICA/End CCA = 6.2	
External			1.46		< 30%
Plaque	Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common			1.08	0.26	< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Bifurcation					< 40%
Plaque	Dense Mixed Calcified				
Disease length from BIF					
Internal			0.88	0.23	< 50%
Plaque	Dense Mixed Calcified				
Disease length from BIF		Pk ICA/Pk CCA = 0.8		Pk ICA/End CCA = 3.4	
External			1.80		< 30%
Plaque	Dense Mixed				
Disease length from BIF					
Vertebral	Open Orthograde				
Subclavian	No Turbulence	Good signal	Triphasic		Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX ASSESSMENT

RIGHT

Mixed, dense and calcified plaques identified in the right internal carotid artery, forming a less than 50% stenosis.

LEFT:

Mixed, dense and calcified plaques identified in the left internal carotid artery, forming a less than 50%

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stenosis.

The right and left vertebral arteries appear patent with orthograde flow.

The right and left subclavian arteries appear widely patent with good triphasic waveforms.

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Reason	Routine
Outcome	Obscured, Calcified, Intimal hyperplasia, Mild disease

Right		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Dense Mixed		0.47	0.15	< 40%
Disease length from BIF					
Bifurcation					
Plaque	Dense Mixed Calcified				< 50%
Disease length from BIF					
Internal					
Plaque	Dense Mixed Calcified		1.04	0.22	< 50%
Disease length from BIF					
External					
Plaque	Calcified		0.25		50% - 95%
Disease length from BIF					
Vertebral					
Open Orthograde					
Subclavian					
No Turbulence			Good signal	Triphasic	Widely Patent
Left		Diameter (cm)	PSV (m/s)	EDV (m/s)	Stenosis
Common					
Plaque	Dense Mixed Calcified		1.05	0.17	< 50%
Disease length from BIF					
Bifurcation					
Plaque	Dense Mixed Calcified				< 40%
Disease length from BIF					
Internal					
Plaque	Dense Mixed Calcified		0.77	0.16	< 40%
Disease length from BIF					
External					
Plaque	Dense Mixed		0.84		< 40%
Disease length from BIF					
Vertebral					
Open Orthograde					
Subclavian					
No Turbulence			Good signal	Triphasic	Widely Patent

Stenosis based on NASCET methods.

Disease within large diameter carotid bulb is measured using direct diameter methods as recommended in Oates et al (2009).

Notes

CAROTID DUPLEX (Previous Right stent and Left CEA)

RIGHT:

Stent identified in the right distal common carotid artery, which extends through the right carotid bifurcation and right proximal internal carotid artery (ICA), which appears patent. Mixed, dense, and calcified plaques identified in the right proximal ICA turbulent flow identified ?due to change in stent calibre in the right carotid bifurcation to right proximal ICA, however visually appears as a 40-49% stenosis. Right distal ICA appears patent. The right external carotid artery was obscured at origin for ~1cm. Flow distal to the obscured region

Assessed by Emily Davies, MCVS

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appears reduced with retrograde flow being identified from an ECA branch ?significant stenosis in the obscured region

LEFT:

Intimal hyperplasia with mixed, dense, and calcified plaques identified in the left internal carotid artery, forming a less than 40% stenosis.

Additional comments:

The right and left vertebral arteries appear patent with antegrade flow, bilaterally. The right and left subclavian arteries appear widely patent with good biphasic waveforms, bilaterally.

Assessed by Emily Davies, MCVS

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