CAROTID AND VERTEBRAL ARTERY DUPLEX

PROTOCOL

Drafted by: Ms Sorcha Murray (SM) and Dr Cleona Gray (CG)

Authorised by: Dr Cleona Gray

Signature: _____ **Date: 05.05.2020**

1.0 Purpose

Extracranial cerebrovascular Duplex ultrasound examinations are carried out to assess the presence of pathology and the haemodynamic status of the common carotid artery (CCA), internal carotid artery (ICA) external carotid artery (ECA) and vertebral artery.

2.0 Revision History

Date	Revision No.	Change	Reference Section(s)
24.07.2019	5	General Update	Entire Protocol
06.04.2020	6	General Update	Entire Protocol

3.0 Persons Affected

All Vascular Laboratory Physiologists, Vascular Consultants, NCHD's and Patients of the Vascular Laboratory

4.0 Policy

The policy is to ensure that all Vascular Laboratory Clinical Staff are aware of and understand the protocol for Duplex Assessment of and the follow up of patients with carotid artery disease as appropriate.

5.0 Definitions

Vascular Laboratory Physiologists (VP), Vascular Laboratory (VL), Patient Centre (PC), Common carotid artery (CCA, Internal carotid artery (ICA), External carotid artery (ECA), Vertebral Artery (VA), Transient ischemic attacks (TIA), Cerebrovascular Accident (CVA), Coronary Artery Bypass Graft (CABG), Peak Systolic Velocity (PSV), End diastolic Velocity (EDV), Non consultant hospital doctors (NCHD)

6.0 Responsibilities

Vascular Physiologists, Vascular Consultants, Vascular Surgical Team and Vascular Administrating staff

7.0 Procedures

Carotid and Vertebral Artery Duplex Ultrasound Examination

Reference: Vascular Laboratory Practice Manuals Part 2

Common Indications:
Common indications for performance of this examination can include:

- Transient ischemic attacks (TIA)
- Amaurosis fugax
- Carotid bruit
- Cerebrovascular Accident (CVA)
- Follow-up of known carotid stenosis
- Post intervention follow-up e.g. carotid endarterectomy, carotid stenting or bypass
- Trauma in the distribution of the carotid artery e.g. suspected dissection, arteriovenous fistula or pseudo aneurysm
- Pre-operative assessment for high risk patients e.g. Vascular Surgery, Patients undergoing coronary artery bypass surgery (CABG), Aortic Valve replacement, Orthopaedic Surgery or other surgeries when required by the pre op assessment clinic.
- Pulsatile neck masses
- Evaluation of suspected subclavian steal syndrome

Contraindications and Limitations:
Contraindications for extracranial cerebrovascular Duplex ultrasound are few; however, some limitations exist and may include the following:

- Patients with short, thick muscular necks
- Patients who have had recent surgery, ultrasound visualisation may be limited due to oedema, haematoma, surgical staples, dressings etc.
- Calcified plaque may cause acoustic shadowing limiting Doppler and B-mode image assessment.
- Patients who are unable to lie flat due to pre-existing co-morbidities e.g. chronic obstructive pulmonary disease (COPD) and arthritis – although these patients may be able to tolerate being examined seated in a chair or with the head of the bed raised
- Patients who are unable to cooperate due to reduced cognitive functions e.g. Alzheimer's or dementia and through involuntary movements
- Examinations undertaken portably at the patient's bedside maybe limited due to room functionality such as lay out and brightness.

Equipment:

- Regularly safety checked and maintained Duplex ultrasound machine with imaging frequencies of 5.0MHz or greater; Doppler frequencies of at least 3.0MHz and linear array transducer/s with colour Doppler capability
- Examination couch should be height adjustable preferably electrical. The VP's chair should provide good lumbar support, be height adjustable and allow for the VP to move close to the examination couch
- At all-times the examination room should be temperature controlled with adjustable lighting levels suitable for examination
- Suitable cleaning materials should be available in line with local and manufactures guidelines
- All ultrasound system should undergo regular service checks as provided by the Vendor of the system. A suitable log of these records should be maintained
- All ultrasound cables must be hooked up off the floor onto the back of the ultrasound system (Picture 1 Below). It is the physiologist responsibility to ensure that the surrounding environment is safe for both themselves and the patient

Picture 1.0 Machine Hook for Cables

Explanation of examination and patient history:

The Physiologist undertaking the examination should:

- Introduce themselves
- Confirm the patient's identity e.g. full name and date of birth
- Explain why the examination is being performed and give an indication of the test's duration
- Give an explanation of the procedure and it's duration – consideration should be made to the age and mental status of the patient
- Obtain verbal consent for the examination
- Obtain a pertinent relevant medical history from the patient and/or notes
- Presence of risk factors as appropriate

- Presence of cerebrovascular disease e.g. aphasia, dysphasic, paralysis etc.
- Verify that the requested procedure correlates with the patient's clinical presentation

Examination:

Reference: Vascular Laboratory Practice Manuals Part 2

- The patient is asked to adjust their clothing to expose the neck area
- The patient is examined in the supine position with their head/neck positioned in such a manner that allows the VP maximum access to the vessels to be examined
- The patient's dignity and privacy should be maintained at all times
- The standard examination should examine bilaterally the arterial supply to the head encompassing the common carotid artery (CCA), carotid bifurcation, external carotid artery (ECA) and internal carotid artery (ICA) to its most accessible distal extracranial segment. The vertebral artery should be identified to confirm direction of flow. In the presence of reversed or partially reversed flow the subclavian artery should be examined
- The CCA, carotid bifurcation, ECA and ICA are identified in B Mode using the transverse plane and longitudinal plane; B-mode can be used to classify echogenicity of any plaque and the surface characteristics e.g. irregular, smooth or ulcerated
- Using longitudinal plane with colour and spectral Doppler (angle of 40-60 degrees and parallel to the vessel wall), the extra cranial carotid arteries should be assessed for any areas for velocity increase or turbulence from the CCA to the distal ICA and the vertebral artery

- Peak systolic velocities (PSV) and end diastolic velocities (EDV) should be measured and documented for a minimum of the CCA and ICA
- Direction of flow must also be documented in the vertebral artery
- The anatomical location of any haemodynamically significant lesion should be documented. A significant stenosis is noted and graded appropriately following the standard widely accepted criteria laid out by Oats et al 2009. (Table 1.0) (See reporting Standards Folder for full Text)
- Plaque characteristics should also be documented, and the length of the lesion may also be documented
- In appropriate cases the diameter reduction measurements can be made on the B-mode image and documented in the report, however these will be dependent on appropriate gain selection and choice of imaging plane. Diameter measurements made in the bulb should be made using the NASCET method to correlate with the velocity criteria used, (unless clearly stated as being ESCT measurements)

Velocity Criteria (cm/s)	ICA stenosis
PSV ≤110 In the presence of Plaque	0-29%
PSV 110-125 In the presence of Plaque	30-49%
PSV >125 and ICA/CCA ratio <4	50-69%
PSV >125 and ICA/CCA ratio >4 or EDV >110cm/sec	70-80%
PSV >125 and EDV ≥140	80-90%
PSV >125 and EDV ≥200	90-99%
No colour flow or Doppler signal	Occluded
CCA/ECA Ratio	**ECA Stenosis**
Doubling of velocities	>50%
Trebling of velocities	>75%
Four times velocities	>95%

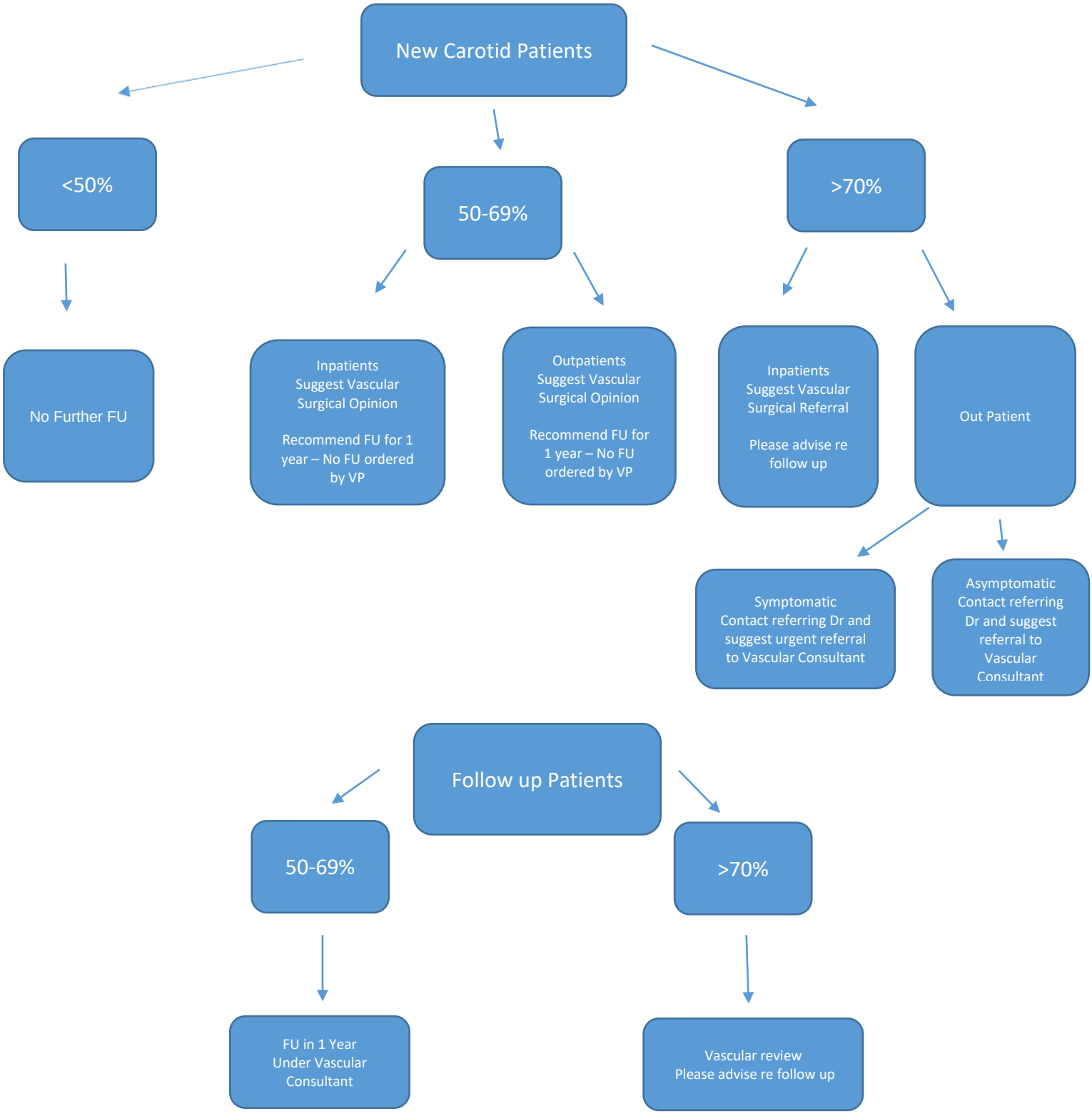
Table 1.0 Criteria for Extracranial carotid artery duplex assessment (Oates et al, 2009)

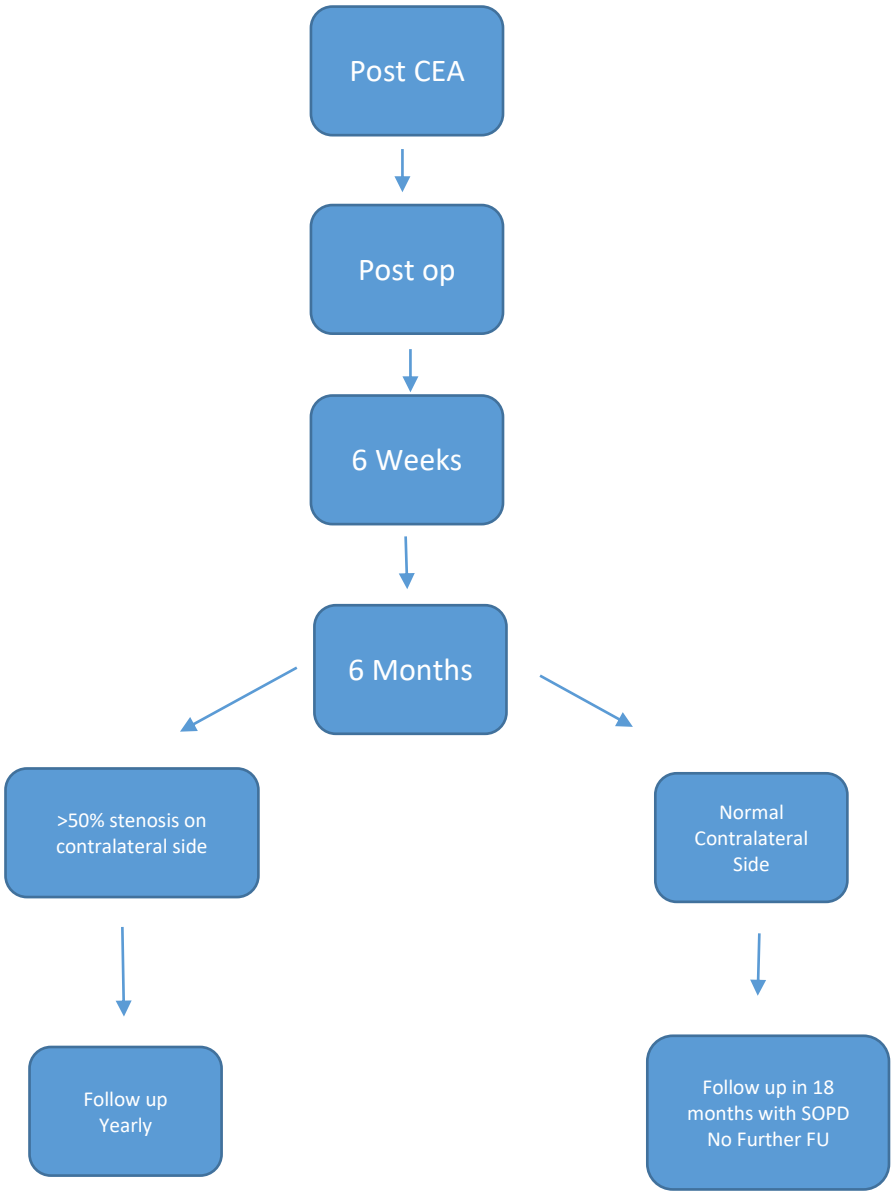
Reporting:
The report is a recording and interpretation of observations made during the extracranial carotid arterial duplex ultrasound examination; it should be written by the VP undertaking the examination and viewed as an integral part of the whole examination.
The report should include correct patient demographics; date of examination; examination type and the name and status of the Physiologist.

The reporting should include:

- Which arteries have been assessed & record the presence/absence of disease
- The following four velocities:
  - PSV & EDV in the CCA 1-2cm below the bifurcation
  - PSV & EDV in the ICA at the point of highest velocity
- Qualitatively note the nature of the plaque e.g. calcified, echolucent, irregular, smooth etc, the length and anatomical position
- Percentage degree of stenosis
- Any limitations e.g. calcified plaque causing acoustic shadowing
- An appropriate number of annotated images that represent the entire ultrasound examination - in accordance with local protocols and SVT Image Storage Guidelines
- Referral of critical ultrasound results should be made to the referring consultant or appropriate medical/surgical team (as per local protocol) prior to the patient being discharged so that treatment plans can be developed, enforced or expedited accordingly.

Follow Up Procedures




Post CEA
Post op
6 Weeks
6 Months
>50% stenosis on contralateral side
Normal Contralateral Side
Follow up Yearly
Follow up in 18 months with SOPD No Further FU

CAROTID AND VERTEBRAL ARTERY DUPLEX

REPORTS

Vascular Laboratory Report

Mater Private Network
Phone: +353(0)1800 200 550 Fax: +353(0)1885 8486
Email: vascular@materprivate.ie Web: www.heartcentre.ie

Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	10/05/2023	**Report Authorised:**	12/05/2023 09:50:02

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 10/05/2023 07:11

Clinical Indication: Pre Op CABG

Findings:
Right: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery demonstrates mixed echogenic plaque extending 3.0cm from the bifurcation causing a 50-69% stenosis (ICA/CCA=greater than 60% stenosis). Patent vertebral artery with antegrade flow.

Left: The common and external carotid arteries demonstrates mild atheroma causing no significant stenosis. The internal carotid artery demonstrates mixed echogenic plaque proximally causing a 0-29% stenosis. Patent vertebral artery with antegrade flow.

Follow up: Suggest vascular referral. For follow up in 1 year

Vascular Laboratory Report

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	12/05/2023	**Report Authorised:**	16/05/2023 12:00:24

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 12/05/2023 09:33

Clinical Indication: Health check

Findings:
Right: The common carotid artery demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates a greater than 50% stenosis. The internal carotid artery demonstrates irregular echogenic plaque extending ~1.8cm from the bifurcation causing a 50-69% stenosis (ICA/CCA= greater than 60%) Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates a greater than 50% stenosis. The internal carotid artery demonstrates calcific plaque extending 2.5cm from the bifurcation causing a region of acoustic shadowing (0.4cm) Velocities distal to the shadowing are in keeping with a 0-29% stenosis, however a higher grade stenosis cannot be outruled. Patent vertebral artery with antegrade flow.

Follow up: Suggest vascular referral. Suggest follow up in 1 year

Mater Private Network

Vascular Laboratory Report

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	12/05/2023	**Report Authorised:**	16/05/2023 12:41:43

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 12/05/2023 14:50

Clinical Indication: Previously (11/2022) RICA = 0-29%, LICA = 70-80%

Findings:
Right: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery demonstrates calcific plaque proximally causing a 0-29% stenosis. Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates mild atheroma causing no significant stenosis (PSV =34cm/s). The internal carotid artery demonstrates irregular calcific plaque extending ~1.2cm at the origin causing a region of acoustic shadowing (0.5cm). Velocities distal to the shadowing are in keeping with a 70-80% stenosis (PSV =327cm/s, EDV = 79cm/s), however a higher grade stenosis cannot be outruled. The external carotid artery demonstrates a greater than 95% stenosis at its origin. Patent vertebral artery with antegrade flow.

Follow up: 6 months

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Vascular Laboratory Report

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	19/05/2023	**Report Authorised:**	19/05/2023 13:08:09

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 19/05/2023 11:00

Clinical Indication: RICA 70-79% on ultrasound

Findings:
Right: The common carotid artery demonstrates mild atheroma causing no significant stenosis (PSV=64cm/s). The internal carotid artery demonstrates calcific plaque extending ~3.5cm from the bifurcation causing regions of acoustic shadowing. Velocities distal to the shadowing are in keeping with a 70-80% stenosis (PSV=292cm/s, EDV=90cm/s), however a higher grade stenosis cannot be outruled. Beyond this the ICA is widely patent. The external carotid artery demonstrates a greater than 50% stenosis. Patent vertebral artery with antegrade flow.

Left: The common and external carotid arteries demonstrates mild atheroma causing no significant stenosis. The internal carotid artery demonstrates minimal echogenic plaque causing a 0-29% stenosis. Patent vertebral artery with antegrade flow.

Follow up: For review in Rooms today 19/05/2023, please advise re follow up

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Vascular Laboratory Report

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Email: vascular@materprivate.ie Web: www.heartcentre.ie

Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	22/05/2023	**Report Authorised:**	23/05/2023 12:02:56

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 22/05/2023 11:52

Clinical Indication: Previously (05/2022) RICA = 0-29%, LICA = 50-69%

Findings:
Right: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis (PSV CCA = 125cm/s). The internal carotid artery demonstrates mixed echogenic plaque causing a 50-69% stenosis (PSV = 130cm/s). Patent vertebral artery with antegrade flow.

Left: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis (PSV CCA = 96cm/s) The internal carotid artery demonstrates mixed echogenic plaque extending for ~1.6cm from the bifurcation causing a 50-69% stenosis (PSV = 244cm/s). Patent vertebral artery with antegrade flow.

Follow up: 1 year

Vascular Laboratory Report

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Email: vascular@materprivate.ie Web: www.heartcentre.ie

Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	22/05/2023	**Report Authorised:**	23/05/2023 12:01:35

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 22/05/2023 13:38

Clinical Indication: Previously (05/2022) RICA = Distal Occlusion. LICA = 50-69%

Findings:
Right: The common carotid artery demonstrates mild atheroma causing no significant stenosis (PSV = 47cm/s). The internal carotid artery demonstrates calcific plaque proximally causing a region of acoustic shadowing (0.6cm). Velocities distal to the shadowing are in keeping with a 70-80% stenosis (PSV = 292cm/s, EDV = 136cm/s) however a higher grade stenosis cannot be outruled. The ICA is patent for ~2.8cm from the bifurcation. Beyond this no colour flow or Doppler signal detected in the distal vessel in keeping with occlusion, as before. The external carotid artery demonstrates a greater than 50% stenosis. Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates mild atheroma causing no significant stenosis (PSV = 74cm/s). The internal carotid artery demonstrates mixed echogenic plaque proximally causing a 50-69% stenosis (PSV= 182cm/s, EDV=36cm/s). The external carotid artery demonstrates a greater than 50% stenosis. Patent vertebral artery with antegrade flow.

Follow up: 1 year

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	29/05/2023	**Report Authorised:**	30/05/2023 11:42:37

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 29/05/2023 07:52

Clinical Indication: Pre Op CABG

Findings:
Right: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis (PSV= 30cm/s). The internal carotid artery demonstrates echogenic plaque extending ~1.1cm in the proximal vessel causing a 70-80% stenosis (PSV=137cm/s). Patent vertebral artery with antegrade flow.

Left: The common and external carotid arteries demonstrate mixed echogenic plaque causing no significant stenosis (PSV= 81cm/s). The internal carotid artery demonstrates calcific plaque extending ~2.2cm in the proximal vessel causing a 0-29% stenosis (PSV=108cm/s). Patent vertebral artery with antegrade flow.

Follow up: Suggest urgent vascular surgical consult. Suggest follow up in 6 months.

Mater Private Network

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	29/05/2023	**Report Authorised:**	30/05/2023 11:41:29

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 29/05/2023 18:37

Clinical Indication: Pre Op CABG

Findings:
Right: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery demonstrates echogenic plaque proximally causing a 30-49% stenosis. Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates smooth mixed echogenic plaque in the proximal-mid vessel causing no significant stenosis. The external carotid artery demonstrates mild atheroma causing no significant stenosis. The internal carotid artery demonstrates mixed echogenic plaque proximally causing a 0-29% stenosis. Patent vertebral artery with antegrade flow.

Follow up: No vascular lab follow up arranged

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Email: vascular@materprivate.ie Web: www.heartcentre.ie

Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	31/05/2023	**Report Authorised:**	02/06/2023 10:30:30

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 31/05/2023 13:49

Clinical Indication: Previously (12/2022) RICA = 70-80%, LICA = Patent

Findings:
Right: The common carotid artery is patent with no significant plaque imaged (PSV = 68cm/s). The internal carotid artery demonstrates irregular mixed echogenic plaque extending for ~3.3cm causing an 80-90% stenosis (PSV= 439cm/s, EDV= 150cm/s). Beyond this the ICA is patent in the mid and distal vessel. The external carotid artery demonstrates a greater than 75% stenosis at its origin. Patent vertebral artery with antegrade flow.

Left: The common carotid artery is patent no significant stenosis detected. The internal carotid artery is widely patent 1 year post CEA with no obvious plaque or flow disturbance note. The external carotid artery demonstrates a greater than 50% stenosis. Patent vertebral artery with antegrade flow.

Follow up: For review in Rooms today, for follow up in 6 months unless otherwise requested

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Vascular Laboratory Report

Phone: +353(0)1800 200 550 Fax: +353(0)1885 8486
Email: vascular@materprivate.ie Web: www.heartcentre.ie

Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	31/05/2023	**Report Authorised:**	02/06/2023 10:33:38

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 31/05/2023 15:34

Clinical Indication: 6 weeks post Right CEA, previously (04/2023) RICA = patent, LICA = Occluded

Findings:
Right: The common and external carotid arteries are patent with no significant stenosis detected. The internal carotid artery is widely patent post CEA. An increase in velocities in keeping with a 50-69% stenosis noted just beyond the distal endarterectomy site (PSV= 137cm/sec). No significant plaque formation imaged, query due to change in calibre and angle of vessel at this level . Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates mixed echogenic plaque throughout its length with a peripheral type signal detected (PSV = 16cm/s). The internal carotid artery demonstrates predominately echolucent plaque throughout its length with no colour flow or Doppler signal detected in keeping with occlusion of the vessel, as before. The external carotid artery demonstrates mixed echogenic plaque proximally causing a greater than 95% stenosis. Patent vertebral artery with antegrade flow.

Follow up: For review in Rooms today 31/05/2023, for follow up in 1 year

Vascular Laboratory Report

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	07/06/2023	**Report Authorised:**	09/06/2023 10:17:06

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 07/06/2023 15:51

Clinical Indication: Right lower limb weakness.

Findings:
Previously (08/2019): RICA = 0-29%, LICA = 0-29%.

Right side: The common carotid artery demonstrates mild atheroma causing no significant stenosis. The internal carotid artery demonstrates calcific plaque proximally causing a region of acoustic shadowing (0.28cm). Velocities beyond this are in keeping with a 30-49% stenosis, however a higher grade stenosis cannot be outruled. The external carotid artery demonstrates a greater than 50% stenosis. The vertebral artery is patent with antegrade flow.

Left side: The common carotid artery demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates mixed echogenic plaque at the origin causing no significant stenosis. The internal carotid artery demonstrates minimal mixed echogenic plaque causing a 0-29% stenosis. The vertebral artery is patent with antegrade flow.

Follow up: No follow up.

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Vascular Laboratory Report

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	12/06/2023	**Report Authorised:**	13/06/2023 11:53:13

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 12/06/2023 16:30

Clinical Indication: Query aneurysmal carotid

Findings:
The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis.

The internal carotid arteries demonstrate mild atheroma causing no significant stenosis bilaterally.

The vertebral arteries are patent with antegrade flow noted bilaterally.

The portions of the subclavian arteries imaged supra clavicularly are patent with no significant stenosis detected.

No evidence of aneurysmal dilation noted throughout the extra cranial carotid systems bilaterally.

Note: An echolucent region (1.0cm x 1.6cm) noted in the right thyroid lobe. No flow noted within. Impression: Cyst. Suggest formal ultrasound if clinically indicated.

Follow up: No vascular lab follow up arranged

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Vascular Laboratory Report

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	16/06/2023	**Report Authorised:**	20/06/2023 13:15:58

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 16/06/2023 09:36

Clinical Indication: Previously (06/2022) RICA = 50-69%, LICA = 30-49%.

Findings:
Right: The common carotid artery demonstrates mild atheroma causing no significant stenosis (PSV = 89cm/s). The internal carotid artery demonstrates calcific plaque extending for ~1.8cm from the bifurcation causing a region of acoustic shadowing for ~0.5cm. Velocities distal to the shadowing are in keeping with a 50-69% stenosis (PSV = 260cm/s) however cannot outrule a higher grade stenosis. The external carotid artery demonstrates echogenic plaque causing no significant stenosis. Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates mild atheroma causing no significant stenosis (CCA PSV = 123cm/s). The internal carotid artery demonstrates calcific plaque extending for ~1.9cm from the bifurcation causing velocities in keeping with a 50-69% stenosis (PSV = 132cm/s). The external carotid artery demonstrates echogenic plaque causing no significant stenosis. Patent vertebral artery with antegrade flow.

Follow up: 1 year

Mater Private Network

Vascular Laboratory Report

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Email: vascular@materprivate.ie Web: www.heartcentre.ie

Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	03/07/2023	**Report Authorised:**	04/07/2023 11:50:51

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 03/07/2023 11:55

Clinical Indication: Hx CVA, Left CEA ?2 years ago under Mr Mulkern (MMUH)

Findings:
Right: The common carotid artery demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates echogenic plaque causing no significant stenosis. The internal carotid artery demonstrates echogenic plaque proximally causing a 0-29% stenosis. Patent vertebral artery with antegrade flow.

Left: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery is widely patent proximally post CEA and demonstrates minimal mixed echogenic plaque in the mid vessel causing no significant stenosis. Patent vertebral artery with antegrade flow.

Follow up: No vascular lab follow up arranged

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	03/07/2023	**Report Authorised:**	04/07/2023 11:54:50

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 03/07/2023 10:20

Clinical Indication: 4 Days Post Right CEA

Findings:
Previously (06/2023): RICA = 70-80%, LICA = 0-29%

Right: The proximal common carotid artery demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates mild atheroma causing no significant stenosis. The internal carotid artery is widely patent 4 days post CEA with no evidence of abnormality detected. Patent vertebral artery with antegrade flow.

Left: The common and external carotid arteries demonstrate mixed echogenic plaque causing no significant stenosis. The internal carotid artery demonstrates mixed echogenic plaque proximally causing a 0-29% stenosis. Patent vertebral artery with antegrade flow.

Follow up: 6 weeks

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Vascular Laboratory Report

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Email: vascular@materprivate.ie Web: www.heartcentre.ie

http://www

Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	05/07/2023	**Report Authorised:**	06/07/2023 13:40:48

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 05/07/2023 10:56

Clinical Indication: Previously (07/2022) RICA = 0-29%, LICA = 70-80%

Findings:
Right: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery demonstrates echogenic plaque proximally causing a 0-29% stenosis. Patent vertebral artery with antegrade flow.

Left: The common carotid artery (35cm/sec) demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates calcific plaque proximally causing a greater than 50% stenosis. The internal carotid artery demonstrates irregular echogenic plaque extending ~2.1cm from the origin of the vessel causing velocities in keeping with a 50-69% stenosis (PSV= 132 cm/s, ICA/CCA = greater than 60% stenosis), Patent vertebral artery with antegrade flow.

Follow up: No vascular lab follow up arranged

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Email: vascular@materprivate.ie Web: www.heartcentre.ie

Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	05/07/2023	**Report Authorised:**	06/07/2023 13:43:41

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 05/07/2023 15:16

Clinical Indication: RICA stenosis on CT

Findings:
Right: The common carotid artery demonstrates calcific plaque in the distal vessel causing no significant stenosis. The external carotid artery demonstrates calcific plaque causing a greater than 95% stenosis. The internal carotid artery demonstrates calcific plaque extending ~1.9cm from the distal CCA into the proximal ICA causing a region of acoustic shadowing (1.9cm). Velocities distal to the shadowing are in keeping with a 70-80% stenosis, however a higher grade stenosis cannot be outruled. Beyond this the ICA is widely patent. The vertebral artery is patent with antegrade flow.

Left side: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery demonstrates echogenic plaque extending ~2.1cm from the bifurcation causing an ~50% stenosis (PSV=125cm/sec). Beyond this the ICA is widely patent. The vertebral artery is patent with antegrade flow.

Follow up: Suggest urgent vascular consult, no vascular lab follow up arranged

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	10/07/2023	**Report Authorised:**	18/07/2023 12:06:35

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 10/07/2023 11:04

Clinical Indication: Known ICA stenosis, previous scan in radiology in 2016

Findings:
Right: The common carotid artery demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates a greater than 50% stenosis. The internal carotid artery demonstrates mixed echogenic plaque extending ~2.1cm in the proximal vessel causing a 50-69% stenosis (PSV=233cm/s, EDV=73cm/s). Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates a greater than 95% stenosis. The internal carotid artery demonstrates calcific plaque extending ~2.8 cm from the origin causing a region of acoustic shadowing (1.1). Velocities distal to the shadowing are in keeping with a 50-69% stenosis (PSV=166cm/s, EDV=40cm/s), however a higher grade stenosis cannot be outruled. Patent vertebral artery with antegrade flow.

Follow up: For review in Rooms today 10/07/2023, for follow up in 1 year

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	14/07/2023	**Report Authorised:**	18/07/2023 12:14:04

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 14/07/2023 10:52

Clinical Indication: Query carotid stenosis. History of visual disturbance

Findings:
Right: The common internal and external carotid arteries demonstrate mild atheroma causing no significant stenosis. Patent vertebral artery with antegrade flow.

Left: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery demonstrates echogenic plaque extending 2.1cm proximally causing a 0-29% stenosis. Patent vertebral artery with antegrade flow.

Follow up: no vascular lab follow up arranged

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	19/07/2023	**Report Authorised:**	20/07/2023 13:13:33

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 19/07/2023 15:26

Clinical Indication:

Findings:
Right: The common carotid artery demonstrates echogenic plaque in the mid-distal vessel causing no significant stenosis. The external carotid artery demonstrates mild atheroma causing no significant stenosis. The internal carotid artery demonstrates echogenic plaque at the origin causing a 0-29% stenosis. Patent, well developed, vertebral artery with antegrade flow (86cm/sec).

Left: The common carotid artery demonstrates minimal echogenic plaque in the distal vessel causing no significant stenosis. The external carotid artery demonstrates mild atheroma causing no significant stenosis. The internal carotid artery demonstrates echogenic plaque at the origin causing a 0-29% stenosis. Patent, well developed, vertebral artery with retrograde flow (-100cm/sec) noted throughout its visualised length. Unable to image the origin of the vertebral artery behind the clavicle. The portions of the subclavian artery imaged supraclavicularly are patent with no significant stenosis detected (PSV=138cm/sec)

Follow up : For review in Rooms today 19/07/2023, no vascular lab follow up arranged, please advise if required.

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	21/07/2023	**Report Authorised:**	21/07/2023 15:00:18

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 21/07/2023 10:49

Clinical Indication: Previously (01/2023) RICA=70-80%, LICA=70-80%.

Findings:
Right: The common carotid artery demonstrates mixed echogenic plaque distally causing no significant stenosis (PSV = 73cm/s). The internal carotid artery demonstrates irregular surfaced mixed echogenic plaque extending ~2.2cm from the bifurcation causing velocities in keeping with 70-80% stenosis (PSV=307cm/s, EDV=77cm/s), as before. Beyond this the ICA is patent. The external carotid artery demonstrates a greater than 75% stenosis. Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates moderate atheroma throughout its length causing no significant stenosis. Note the distal CCA demonstrates low volume flow (PSV=32cm/s). The internal carotid artery demonstrates calcific plaque extending ~1.6cm from the bifurcation causing a region of acoustic shadowing (0.2cm). Beyond this, velocities detected are in keeping with a 70-80% stenosis (PSV = 209cm/s, EDV = 42cm/s), however cannot out rule a higher grade stenosis behind the shadowing. The external carotid artery demonstrates calcific plaque proximally however no significant stenosis detected. Patent vertebral artery with antegrade flow.

Follow up: 6 months

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	21/07/2023	**Report Authorised:**	21/07/2023 15:08:25

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 21/07/2023 14:14

Clinical Indication: 3 days post Right CEA

Findings:
Right: The common and external carotid arteries are patent with no significant stenosis detected. The internal carotid artery is widely patent 3 days post CEA. An increase in velocities in keeping with a 50-69% stenosis detected at the distal endarterectomy site at the level of a kink, however no significant plaque formation imaged at this level. Impression: due to tortuosity. Patent vertebral artery with antegrade flow.

Left: The common and external carotid arteries are patent with no significant stenosis detected. The internal carotid artery is widely patent 1 year post CEA with no obvious plaque or flow disturbance note. Patent vertebral artery with antegrade flow.

Follow up: 8 weeks

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	24/07/2023	**Report Authorised:**	25/07/2023 14:27:28

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 24/07/2023 14:32

Clinical Indication: Pre Op CABG

Findings:
Difficult study due to depth of vessels

Right: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery demonstrates calcific plaque extending ~2.7cm from the distal common carotid artery causing a region of acoustic shadowing (0.67cm). Velocities distal to the shadowing are in keeping with a 30-49% stenosis, however a higher grade stenosis cannot be outruled. Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates mixed echogenic plaque causing no significant stenosis. The internal carotid artery demonstrates echogenic plaque proximally causing no significant stenosis. Patent vertebral artery with low volume antegrade flow.

Follow up: No vascular lab follow up arranged

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	02/08/2023	**Report Authorised:**	03/08/2023 07:33:24

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 02/08/2023 15:56

Clinical Indication: Pre Op CABG

Findings:
Right: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery demonstrates echogenic plaque extending ~1.0cm at the origin causing a 50-69% stenosis. Patent vertebral artery with antegrade flow.

Left: The common carotid artery demonstrates mild atheroma causing no significant stenosis. The external carotid artery demonstrates a greater than 50% stenosis. The internal carotid artery demonstrates echogenic plaque extending ~1.7cm at the origin causing a 50-69% stenosis. Patent vertebral artery with antegrade flow.

Follow up: Suggest vascular referral. Suggest follow up in 1 year

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Referring Clinician:	Patient Name: Patient ID: Date of Birth: Address: Ward: Copy To:

Examination: Carotid and Vertebral Artery Duplex			
Study Date:	04/08/2023	**Report Authorised:**	04/08/2023 10:36:58

Reported by Vascular Physiologist:	Murray Nina
Approved by Vascular Surgeon:	Prof Martin O Donohoe MCN 00290

Test Name: Carotid and Vertebral Artery Duplex 04/08/2023 09:59

Clinical Indication:

Findings:
Right: The common and external carotid arteries demonstrate mild atheroma causing no significant stenosis. The internal carotid artery demonstrates demonstrates mild atheroma causing an increase in velocities in the mid vessel in keeping with a 30-49%stenosis. Impression: partially due to angle of vessel at this level. Patent vertebral artery with antegrade flow.

Left: The common, internal and external carotid arteries demonstrate mild atheroma causing no significant stenosis. Patent vertebral artery with antegrade flow.

Follow up: No vascular lab follow up arranged