CardioVascular

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VASCULAR STUDIES UNIT
Extracranial Cerebrovascular Doppler Ultrasound Examination

Introduction and Scope:
Extracranial cerebrovascular ultrasound examinations are carried out to assess for 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.

Indications for scanning
Indications for performing the ultrasound examination include:

- Transient ischemic attacks (TIA)
- Cerebrovascular Accident (CVA)
- Amaurosis fugax
- Carotid bruit in presence of cardiovascular risk factors
- Follow-up of known carotid stenosis
- Post intervention follow-up e.g. carotid endarterectomy, stent or bypass
- Trauma in the distribution of the carotid artery e.g. suspected dissection, arteriovenous fistula or pseudoaneurysm
- Pre-operative assessment for high risk patients e.g. prior coronary artery bypass surgery (CABG)
- Pulsatile neck masses
- Evaluation of suspected subclavian steal syndrome

Contraindications and limitations for scanning may include:

- Patients who are unable to cooperate due to reduced cognitive functions, e.g Alzheimer's/dementia or involuntary movements,
- Surgical wounds, dressings/bandaging or other implements obscuring a suitable window for examination
- Body habitus and/or highly motile neck

Referral pathways:

- Routine referrals should be made by a member of the patient's care team via EPR
- Urgent referrals from TIA clinic, neurology teams or vascular surgeons should be made on EPR and followed up with a phone call to the Vascular Studies Laboratory unless arranged as part of the agreed process for accommodating TIA clinic patients

Version 2.0 – Approved by Ved Ramnani, Head Clinical Vascular Scientist
In use from 13/11/2023, due for review by 13/11/2025

Equipment:

Approved Vascular Studies instrumentation should be used for this examination. Please see 'Equipment Schedule' document.

Preparation:

It is the duty of the Clinical Vascular Scientist (CVS) to ensure that both the patient and the equipment are positioned correctly to minimise risk of injury to themselves and the patient, and to take precautions to avoid unnecessary strain on the back and/or provocation of work related upper limb disorders (WRULD)[2]. The patient's dignity and privacy must be maintained at all times. It may be necessary to offer a gown and/or a chaperone.[1,3]

Consent:

It is a legal and ethical principle that valid consent be obtained before starting a physical investigation. This principle reflects the right of patients to determine what happens to their own bodies, and is a fundamental part of good practice. It is the responsibility of the CVS carrying out the investigation to ensure verbal consent is obtained[1].

Clinical Governance:

It is the duty of all staff to ensure that the patient's right to confidentiality is always observed and upheld, both during and after their hospital visit and that all patient identifiable records are stored in accordance with trust guidelines and Caldicott Principles.[4]

Method:

As with all scanning protocols the following should be used as a guide – It is the duty of the CVS conducting the study to make appropriate modifications to the examination based on their professional judgement and on the mental and physical health of the patient.

The patient is asked to adjust their clothing to expose their neck from the level of the clavicle to the mandible. The patient is examined supine with their neck extended and mildly rotated towards the opposite side of scanning, or in a suitable position as to allow the CVS maximum access to the vessels being examined.

The following arteries are scanned bilaterally using B-mode, colour Doppler and spectral Doppler, in both transverse and longitudinal planes where appropriate:

- Common carotid artery (CCA)
- Internal carotid artery (ICA)
- External carotid artery (ECA)
- Vertebral artery

- Distal brachiocephalic artery
- Subclavian artery, where appropriate

The carotid arteries are best visualised through the sternocleidomastoid muscle, which acts as a scanning window. Using B-mode, colour and spectral Doppler any disease, vessel tortuosity and/or other abnormal pathology, such as carotid body tumours, should be noted.

Any stenosis found should be examined for its echogenicity and surface characteristics, e.g. irregular, smooth or ulcerated[5]. The anatomical location of any stenosis should be documented. In addition, for a haemodynamically significant stenosis its length and distance from carotid bifurcation should also be stated.

Peak systolic velocities (PSV) and end diastolic velocities (EDV) should be measured and documented in the distal CCA, proximal ICA and proximal ECA as well as at any sites of significant disease as appropriate.

Using the vertebral processes as an anatomical landmark the vertebral artery can be identified. Using colour and spectral Doppler, the patency and direction of flow of the vertebral artery should be confirmed[5]. Any abnormal waveforms should be interrogated further for their cause.

Where subclavian steal is suspected the vertebral artery should be followed to its origin and its inflow arteries examined to assess for disease that may explain this. It may also be beneficial to record the systolic pressure of the brachial artery bilaterally to further support quantification of any related disease. In the presence of partial subclavian steal, it may be beneficial to exercise the arm to help characterize whether the abnormal flow profile is indeed due to subclavian steal.

Measurements and Grading Criteria:

Untreated Carotid Artery Stenosis

The severity of an ICA stenosis is graded by using the standard criteria:

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

Table 1. Criteria for Extracranial carotid artery duplex examination[5]

- For non-significant ICA stenosis (<50%), visual and haemodynamic information should be appropriately used to aid interrogation and grading of the lesion as either a 1-29% or 30-49% stenosis.
- For ECA stenoses, visual and haemodynamic information should be appropriately used to aid interrogation and grading of the lesion as either a <50% or >50% stenosis. A doubling in PSVs is accepted as a >50% stenosis in the ECA.
- For CCA stenoses not in continuity with ICA disease, visual and haemodynamic information should be appropriately used to aid interrogation and grading of the lesion as 1-29%, 30-49%, 50-69% or >70%. For all lesions >50% a PSV ratio of 2-4 should typically be seen to correspond to 50-69% stenosis and ratio of >4 to >70% stenosis.
- Diameter reduction measurements can be made on the B-mode image, however these will be dependent on appropriate gain selection and choice of imaging plane. Diameter measurements made in the ICA and particularly the carotid bulb should be made using the NASCET method to correlate with the velocity criteria used (unless clearly stated as being ESCT measurements)[5].

Post Endarterectomy and/or Stenting

- PSVs are generally higher post endarterectomy and within stents. The following PSV cut offs have been reported for grading disease severity[6]:

Percentage Stenosis	Post-endarterectomy	In stent re-stenosis
50-69%	PSV = ≥ 213 cm/s	PSV = ≥ 220 cm/s ICA_{PSV}/CCA_{PSV} = ≥ 2.5
>70%	PSV = ≥ 275 cm/s	PSV = ≥ 300 cm/s (EDV ≥ 90 cm/s) ICA_{PSV}/CCA_{PSV} = ≥ 3.8

Table 2. Suggested Criteria for Grading Disease Post-Treatment

Important – The above criteria for disease severity post-endarterectomy and within stents is not well established. It is at the discretion of the CVS to use this criteria as a guideline. Haemodynamic and visual information must all be incorporated into assessment.

Reporting:

The report should include:

- Anatomical location and severity of stenoses/occlusions in line with appropriate criteria
- Plaque characterisation, to include a description of plaque composition and morphology, e.g. soft, calcified, mixed, and irregular, smooth or ulcerated
- Accurate PSV and EDV measurements in the distal CCA and proximal ICA bilaterally with additional velocities where there is disease.
- Vertebral artery patency and flow direction.
- Any limitations

Reports should answer any specific diagnostic questions raised on the referral. The report should also include incidental findings including, carotid dissection, carotid body tumour, carotid aneurysm and carotid tortuosity.

The report should be made available on EPR, and images demonstrating any significant disease as well as showing the velocities and waveforms in the distal CCA, proximal ICA, proximal ECA and vertebral artery bilaterally should be stored on PACS.

Urgent findings should be reported to the referring consultant or appropriate medical/surgical team.

References:

[1] United Kingdom Association of Sonographers (UKAS), 2008, Guidelines for Professional Working Standards Ultrasound Practice, accessed at: www.sor.org/learning/document-library

[2]Society of Radiographers, 2002, The Causes of Musculoskeletal Injury Amongst Sonographers in the UK Society of Radiographers, accessed at: www.sor.org/learning/document-library

[3]Society for Vascular Technology Professional Standards Committee, 2020, Consent and Chaperone Guidelines, accessed at: https://www.svtgbi.org.uk/media/resources/Chaperone_2020.pdf

[4]Department of Health and Social Care, 2013, Caldicott Review: information governance in health and social care, accessed at: https://www.gov.uk/government/publications/the-information-governance-review

[5] Oates CP et al., Joint Recommendations for Reporting Carotid Ultrasound Investigations in the United Kingdom, Eur J Vasc Endovasc Surg (2008), https://www.bmus.org/static/uploads/resources/Recommendations_for_reporting_Carotid_Investigations.pdf

[6]Naylor, A.R., et al. 2018. Editor's choice–management of atherosclerotic carotid and vertebral artery disease: 2017 clinical practice guidelines of the European Society for Vascular Surgery (ESVS). *European Journal of Vascular and Endovascular Surgery*, 55(1), pp.3-81

Other Resources

Zwiebel & Pellerito (2005) Introduction to Vascular Ultrasonography. 5th edition. Elsevier Saunders, Philadelphia.

Society of Vascular Technology Professional Standards Committee, Vascular Technology Professional Performance Guidelines: Extracranial Cerebrovascular Duplex Ultrasound Examination, October 2017, https://www.svtgbi.org.uk/media/resources/Carotid_PPG.pdf

Clinical Indication: Liver transplant assessment
Findings:

US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 81cm/s
ICA EDV= 21cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 103cm/s
ICA EDV= 26cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally.
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 05/08/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: ? CCA stenoses Clinical History: Renal transplant patient. IHD. Pre-CABG work up.
Findings:

US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Smooth calcified plaque in the distal CCA extending into the proximal ICA causing a 1-29% ICA narrowing.
ICA PSV= 57 cm/s
ICA EDV= 22 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:

The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Smooth heterogenous plaque in the proximal ICA causing a 1-29% ICA narrowing.
ICA PSV= 39 cm/s
ICA EDV= 19 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 07/08/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: ? Carotid artery lesion/stenosis Clinical History: 1- HFpEF with previous tAVR ?need redo

Findings:

US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
Smooth calcified plaque in the distal CCA extending into the proximal ICA causing a low end 1-29 narrowing.
ICA PSV= 35 cm/s
ICA EDV= 15 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 57 cm/s
ICA EDV= 20 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 07/08/2023
Reported By:
Rima Begum

Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

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Clinical Indication: ? stenosis on left Clinical History: left lacunar stroke

Findings:

US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 62cm/s
ICA EDV= 15cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 35 cm/s
ICA EDV= 8 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 07/08/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

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Clinical Indication: HIGH RISK TIA - LEFTSIDED WEAKNESS QUERY STENOSIS Clinical History: QUERY STENOSIS

Findings:

US Doppler carotid artery both:
RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 56cm/s

ICA EDV= 19cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 67cm/s
ICA EDV= 19cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 08/08/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: ? Stenosis; suspected tia

Findings:

US Doppler carotid artery both:
RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
Smooth mixed atheroma in the distal CCA extending into the proximal ICA causing a 1-29% ICA narrowing.
ICA PSV= 49 cm/s
ICA EDV= 14 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
Smooth mixed atheroma in the distal CCA extending into the proximal ICA causing a 1-29% ICA narrowing.
ICA PSV= 57 cm/s
ICA EDV= 12 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 15/08/2023
Reported By:
Rima Begum

Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: ? stenosis Clinical History: suspected tia

Findings:

US Doppler carotid artery both:

RIGHT:
Minor calcified plaque noted within the mid to distal CCA.
Heterogenous smooth plaque in the distal CCA extending into the bulb and proximal ICA causing approximately 60-69% ICA stenosis. Slightly turbulent flow beyond the plaque. Distal ICA is patent.
CCA PSV = 65 cm/s
CCA EDV = 6 cm/s
ICA PSV= 241 cm/s
ICA EDV= 67 cm/s

The right proximal ECA has a <50% stenosis.
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
Minor calcified plaque noted within the mid to distal CCA.
Tortuous ICA. Heavily calcified plaque in the proximal ICA obscuring the views however no significantly raised velocities beyond.
ICA PSV= 65cm/s
ICA EDV= 17cm/s
The vertebral artery is patent with antegrade flow demonstrated.

Study Date: 15/08/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

US Doppler carotid artery both:
Clinical Indication: Any carotid disease? Clinical History: Referred by optometrist in view of retinal changes to rule out carotid disease

Findings:
RIGHT:

The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 56cm/s
ICA EDV= 26cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 43cm/s
ICA EDV= 20cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 17/09/2023
Reported By:
Rima Begum
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US Doppler carotid artery both:
Clinical Indication: ?carotid clot / stenosis Clinical History: L sided visual loss acute

Findings:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 50cm/s
ICA EDV= 15cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 41 cm/s
ICA EDV= 12cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 18/09/2023
Reported By:

Rima Begum
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US Doppler carotid artery both:
Clinical Indication: CABG pre op Clinical History: 3VDs

Findings:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
Smooth calcified plaque imaged within the bulb and proximal ICA causing a 30-49% stenosis.
ICA PSV= 135cm/s
ICA EDV= 47cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Smooth calcified plaque imaged within the ICA bulb causing a 1-29% narrowing.
ICA PSV= 55cm/s
ICA EDV= 16cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 18/09/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

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Clinical Indication: ? stenosis Clinical History: suspected tia

Findings: US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.

ICA PSV= 50cm/s
ICA EDV= 21cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 48cm/s
ICA EDV= 26cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 19/09/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: ? stenosis Clinical History: suspected tia
Findings: US Doppler carotid artery both:
RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant stenosis.
The right ICA is slightly tortuous and patent with no significant focal stenosis.
ICA PSV= 55 cm/s
ICA EDV= 20 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant stenosis.
The left ICA is tortuous and patent with no significant focal stenosis.
ICA PSV= 54 cm/s
ICA EDV= 17 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 19/09/2023
Reported By:
Rima Begum
Clinical Vascular Scientist

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Clinical Indication: ? stenosis Clinical History: suspected tia
Findings: US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 68cm/s
ICA EDV= 28cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 69cm/s
ICA EDV= 24cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 19/09/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

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Clinical Indication: ? stenosis Clinical History: suspected tia
Findings:

US Doppler carotid artery both:
RIGHT:
Significant heterogenous atheroma noted in the right distal common carotid artery (CCA) causing a near occlusion of the vessel. There is narrow string like flow noted within the plaque with high resistant waveforms.
The right internal carotid artery (ICA) appears nearly occluded (>90%) with a narrow string like flow within.
Branches of the right external carotid artery (ECA) appear patent however unable to visualise flow in the proximal ECA.
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:

There is heterogenous plaque noted in the distal CCA causing an approx. 50% reduction in the vessel diameter.
There is a significantly calcified plaque in the left proximal ICA causing shadowing therefore unable to accurately grade the stenosis, however taking velocity beyond the plaque, it appears to be 50-59% using NASCET velocity criteria.
The left ECA appears occluded with no flow detected within.

CCA PSV= 45 cm/s
CCA EDV= 19 cm/s
ICA PSV= 139 cm/s
ICA EDV= 63 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

Study Date: 03/11/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: ? stenosis Clinical History: suspected tia
Findings:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Minimal amount of smooth mixed atheroma imaged within the bulb and proximal ICA causing a 1-29% narrowing.
ICA PSV= 40 cm/s
ICA EDV= 12 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Minimal amount of smooth mixed atheroma imaged within the bulb and proximal ICA causing a 1-29% narrowing.
ICA PSV= 62 cm/s
ICA EDV= 14 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 13/10/2023
Reported By:
Rima Begum
Clinical Vascular Scientist

Clinical Indication: stenosis? Clinical History: TIA
Findings:
US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
Minor smooth mixed plaque imaged within the bulb and proximal ICA causing a lower end 1-29% narrowing.
ICA PSV= 85 cm/s
ICA EDV= 30 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Minor smooth mixed plaque imaged within the bulb and proximal ICA causing a lower end 1-29% narrowing.
ICA PSV= 70 cm/s
ICA EDV= 25 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 21/11/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: stenosis? Clinical History: infarct on CT head
Findings:
US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 69cm/s
ICA EDV= 22cm/s

The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 64cm/s
ICA EDV= 22cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 21/11/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

US Doppler carotid artery both:
Clinical Indication: ? stenosis Clinical History: suspected tia

Findings:
RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Smooth minor mixed atheroma imaged within the proximal ICA causing a 1-29% narrowing.
ICA PSV= 64cm/s
ICA EDV= 20cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Smooth minor mixed atheroma imaged within the proximal ICA causing a 1-29% narrowing.
ICA PSV= 66cm/s
ICA EDV= 21cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 08/11/2023
Reported By:
Rima Begum
Clinical Vascular Scientist

Clinical Indication: ? STENOSIS Clinical History: SUSPECTED TIA
Findings:
US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
Mixed smooth atheroma imaged in the distal CCA reducing the patent lumen size by approx 20%.
Mixed smooth atheroma imaged within the bulb and proximal ICA causing a 1-29% narrowing.
ICA PSV= 76cm/s
ICA EDV= 17cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Mixed smooth atheroma imaged in the distal CCA reducing the patent lumen size by approx. 30%.
Mixed smooth atheroma imaged within the bulb and proximal ICA causing a 1-29% narrowing.
ICA PSV= 81 cm/s
ICA EDV= 23 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 15/11/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: ? STENOSIS Clinical History: SUSPECTED TIA

Findings:
US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 50 cm/s
ICA EDV= 20 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 47 cm/s
ICA EDV= 14 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 15/11/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

US Doppler carotid artery both:
Clinical Indication: ? stenosis Clinical History: suspected tia
Findings:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 78cm/s
ICA EDV= 31cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 77cm/s
ICA EDV= 27cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:

No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally.
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 08/11/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: ? stenosis Clinical History: suspected tia
Findings:
US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
Smooth heterogenous atheroma imaged within the bulb and proximal ICA causing a 1-29% narrowing.
ICA PSV= 43 cm/s
ICA EDV= 12 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Smooth heterogenous atheroma imaged within the bulb and proximal ICA causing a 1-29% narrowing.
ICA PSV= 42 cm/s
ICA EDV= 12 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally.
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 03/11/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

Clinical Indication: ? stenosis Clinical History: suspected tia
Findings:
US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 82 cm/s
ICA EDV= 20 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
Smooth mixed atheroma imaged within the bulb and proximal ICA causing a 1-29% narrowing.

ICA PSV= 67 cm/s
ICA EDV= 24 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 19/10/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

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Clinical Indication: ? stenosis Clinical History: suspected tia
Findings:
US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Minor smooth mixed plaque imaged within the bulb and proximal ICA causing a 1-29% narrowing.
ICA PSV= 51 cm/s
ICA EDV= 19 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant focal stenosis.
ICA PSV= 53 cm/s
ICA EDV= 19 cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally.
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 19/10/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust

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Clinical Indication: ? stenosis Clinical History: suspected tia
Findings: US Doppler carotid artery both:

RIGHT:
The right common carotid artery (CCA), right internal carotid artery (ICA) and right external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Smooth calcified atheroma imaged within the bulb and proximal ICA causing a lower end 30-49% stenosis.
ICA PSV= 59cm/s
ICA EDV= 22cm/s
The vertebral artery is patent with antegrade flow demonstrated.

LEFT:
The left common carotid artery (CCA), left internal carotid artery (ICA) and left external carotid artery (ECA) are all patent with no evidence of significant stenosis.
Smooth calcified atheroma imaged within the bulb and proximal ICA causing a lower end 30-49% stenosis.
ICA PSV= 52cm/s
ICA EDV= 19cm/s
The vertebral artery is patent with antegrade flow demonstrated.

CONCLUSION:
No haemodynamically significant disease noted in the extra-cranial carotid arteries bilaterally
The right and left vertebral arteries are patent with antegrade flow detected.

Study Date: 19/10/2023
Reported By:
Rima Begum
Clinical Vascular Scientist
Royal Free London NHS Foundation Trust