

Evidence Discussion (PVD 3.1-3.3)

Cerebrovascular and Carotid Disease

Indications for carotid artery imaging are suspicion for carotid stenosis, aneurysm, dissection or vasculitis. The signs and symptoms generally accepted for carotid imaging are listed in the guideline.

Standard first line imaging is the Duplex ultrasound (DU). This study obtains gray-scale pictures, as well as velocity and direction of blood flow in the vessels. The combination of B mode and Doppler techniques allows for detection of all of the above mentioned pathologies. DU has limitations in evaluation of the vertebral artery origins as well as extent of carotid dissection. Therefore, if there is concern for either vertebrobasilar insufficiency or carotid dissection, CT angiography (CTA) or MR angiography (MRA) is supported.

However, DU has become the first-line imaging modality for identifying patients with internal carotid artery stenosis. In part, this is because consensus ultrasound criteria have been developed to standardize carotid ultrasound examinations and categorize carotid artery stenosis severity¹. The rationale for use of DU is its low cost, availability, and high sensitivity and specificity². It avoids exposure to radiation and intravenous contrast agents as well.

CTA and MRA have more limited use for screening due to the risks associated with them. CTA risks include intravenous contrast and radiation exposure. Contrast complications include allergy and contrast induced nephropathy. MRA risk is related to use of gadolinium contrast, which confers the risk of nephrogenic systemic fibrosis in patients with renal insufficiency. MRA also is contraindicated in patients with metallic implants. Additionally, both CTA and MRA are not appropriate for screening purposes, due to their considerable costs³.

It is well established that for carotid stenosis 70-99% in an asymptomatic patient, or 50-99% stenosis in a symptomatic patient, there is a role for carotid intervention for stroke prevention. Once duplex identifies this degree of stenosis, CTA/MRA is indicated for pre-procedure planning. Additionally, CTA/MRA is indicated for patients undergoing evaluation for carotid artery stenting (CAS) as delineation of relevant anatomy is necessary for procedural success.³⁻⁵

PVD 3.2 and PVD 3.3, Surveillance imaging

As described in PVD 3.1, DU is established as the primary diagnostic test for carotid surveillance imaging. Consensus statements have established the appropriate time intervals for repeat imaging. If however, there are new symptoms or physical findings, repeat duplex imaging is supported, regardless of time interval. If at any time there is $\geq 70\%$ re-stenosis, CTA or MRA is indicated.³⁻⁵

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3. Ali F. AbuRahma, MD,a Efthymios D., et al. Society for Vascular Surgery clinical practice guidelines for management of extracranial cerebrovascular disease. J Vasc Surg. 2022 Jan;75(1S):4S-22S.
4. Ricotta J, AbuRahma A, Ascher E, et al. Updated Society for Vascular Surgery guidelines for management of extracranial carotid disease. J Vasc Surg. 2011;54(3):e1–e31.
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