*National Imaging Associates, Inc.	
Clinical guidelines **NECK CTA**	**Original Date: September 1997**
CPT Codes: 70498	**Last Revised Date: May 2023**
Guideline Number: NIA_CG_012-1	**Implementation Date: January 2024**

GENERAL INFORMATION

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*

INDICATIONS FOR NECK CTA

If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:

- Inconclusive or show a need for additional or follow up imaging evaluation **OR**
- The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.

(*Unless approvable in the combination section as noted in the guidelines)

Patients with claustrophobia, limited ability to cooperate, an implanted device or in an urgent situation may be better suited for CTA, whereas those with extensive calcification, renal disease iodine contrast allergy should have MRA.[1]

For evaluation of known or suspected extracranial vascular disease

Cerebrovascular Disease

- Recent ischemic stroke or transient ischemic attack (see Background)[2-4]

Note: For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management

- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech[5-7]
- Asymptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis ≥ 70%, technically limited study, aberrant direction of flow in the carotid or vertebral arteries)[8-10]
- Symptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis ≥ 50%, technically limited study, aberrant direction of flow in the carotid or vertebral arteries)[8, 11, 12]

Aneurysm screening

- Screening for aneurysm in Loeys-Dietz syndrome**, fibromuscular dysplasia or spontaneous coronary arteries dissection (SCAD)[13-16]

**For Loeys-Dietz imaging should be repeated at least every two years

Tumor/pulsatile mass

- Pulsatile mass on exam[17]
- Known or suspected carotid body tumors, or other masses such as a paraganglioma, arteriovenous fistula pseudoaneurysm, atypical lymphovascular malformation[18]

Note: Ultrasound (US) may be used to identify a mass overlying or next to an artery in initial work up of a pulsatile mass.

Other extracranial vascular disease[19]

- Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected extracranial involvement[20-23]
- Subclavian steal syndrome when ultrasound is positive or indeterminate **OR** for planning interventions[24]
- Suspected carotid or vertebral artery dissection; secondary to trauma or spontaneous due to weakness of vessel wall[25, 26]
- To identity an arterial source of bleeding in patients with hemorrhage of the head and neck[27]
- Horner's syndrome (miosis, ptosis, and anhidrosis)[28]
- For evaluation of pulsatile tinnitus (subjective or objective) for suspected arterial vascular etiology[29]
- For further evaluation of a congenital vascular malformation of the head and neck
- Known extracranial vascular disease that needs follow-up or further evaluation

Pre-operative/procedural evaluation

- Pre-operative evaluation for a planned surgery or procedure

Post-operative/procedural evaluation (e.g., carotid endarterectomy)

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification.
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)

INDICATIONS FOR COMBINATION STUDIES

Neck CTA/Brain CTA

- Recent ischemic stroke or transient ischemic attack (TIA)(see Background) [2, 3, 30]

Note: For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management

- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech[5, 7]
- Suspected carotid or vertebral artery dissection; due to trauma or spontaneous due to weakness of vessel wall[25, 26]
- Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment[31, 32]
- Asymptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis ≥ 70%, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate[8-10]
- Symptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g., carotid stenosis ≥ 50%, technically limited study, aberrant direction of flow in the carotid or vertebral arteries) and patient is surgery or angioplasty candidate[8, 11, 12]
- Pulsatile tinnitus (subjective or objective) for suspected arterial vascular etiology[29]

BACKGROUND

For vascular disease, MRA and CTA are generally comparable. No current literature compares the efficacy of contrast enhanced CT to CTA or MRI and MRA for evaluation of pulsatile neck mass, so any are approvable.[33] CTA may be complementary to CT in the following settings: evaluation of a pulsatile neck mass to assess vascular detail when needed; assessment of relevant vascular anatomy for pre-procedural evaluation; vascular supply to tumors and vessel encasement and narrowing by tumors; extent of disease in vasculitis; and to help determine the nature and extent of congenital or acquired vascular anomalies.

MRA vs CTA for Carotid Artery Evaluation[34, 35] - MRA and CTA are generally comparable noninvasive imaging alternatives, each with their own advantages and disadvantages. Advantages of CTA over MRA include superior spatial resolution, rapid image acquisition, decreased susceptibility to motion artifacts and artifacts from calcification as well as being better able to evaluate slow flow and tandem lesions. However, CTA can also overestimate high-grade stenosis. Limitations of CTA include radiation exposure to the patient, necessity of IV contrast, and risk of contrast allergy and contrast nephropathy. MRA is an excellent screening test since it does not utilize ionizing radiation. Duplex US and contrast-MRA is a common choice for carotid artery evaluation. Limitations of MRA include difficulty in patients with claustrophobia and the risk of nephrogenic systemic sclerosis with gadolinium contrast agents in specific patients. In patients with high radiation exposure, MRA as an alternative imaging modality should be considered.

CTA and dissection - Craniocervical dissections can be spontaneous or traumatic. Patients with blunt head or neck trauma who meet Denver Screening criteria should be assessed for cerebrovascular injury (although about 20% will not meet criteria). The criteria include: focal or lateralizing neurological deficits (not explained by head CT), infarct on head CT, face, basilar skull, or cervical spine fractures, cervical hematomas that are not expanding, Glasgow coma score less than 8 without CT findings, massive epistaxis, cervical bruit or thrill.[25, 36-38] Spontaneous dissection presents with headache, neck pain with neurological signs or symptoms. There is often minor trauma or precipitating factor (e.g., exercise, neck manipulation). Dissection is thought to occur due to weakness of the vessel wall, and there may be an underlying connective tissue disorder. Dissection of the extracranial vessels can extend intracranially and/or lead to thrombus, which can migrate into the intracranial circulation causing ischemia. Therefore, MRA of the head and neck is warranted.[26, 39]

CTA and recent stroke or transient ischemic attack (TIA) - A stroke or central nervous system infarction is defined as “brain, spinal cord, or retinal cell death attributable to ischemia, based on neuropathological, neuroimaging, and/or clinical evidence of permanent injury. … Ischemic stroke specifically refers to central nervous system infarction accompanied by overt symptoms, whereas silent infarction causes no known symptoms.”[40] If imaging or pathology is not available, a clinical stroke is diagnosed by symptoms persisting for more than 24 hours. Ischemic stroke can be further classified by the type and location of ischemia and the presumed etiology of the brain injury. These include large-artery atherosclerotic occlusion (extracranial or

intracranial), cardiac embolism, small-vessel disease and less commonly dissection, hypercoagulable states, sickle cell disease and undetermined causes.[41] TIAs in contrast, "are a brief episode of neurological dysfunction caused by focal brain or retinal ischemia, with clinical symptoms typically lasting less than one hour, and without evidence of acute infarction on imaging."[42] On average, the annual risk of future ischemic stroke after a TIA or initial ischemic stroke is 3–4%, with an incidence as high as 11% over the next 7 days and 24–29% over the following 5 years. This has significantly decreased in the last half century due to advances in secondary prevention.[43]

When revascularization therapy is not indicated or available in patients with an ischemic stroke or TIA, the focus of the work-up is on secondary prevention. This includes noninvasive vascular imaging to identify the underlying etiology, assess immediate complications and risk of future stroke. The majority of stroke evaluations take place in the inpatient setting. Admitting TIA patients is reasonable if they present within 72 hours and have an ABCD(2) score ≥3, indicating high risk of early recurrence, or the evaluation cannot be rapidly completed on an outpatient basis.[42] Minimally, both stroke and TIA should have an evaluation for high-risk modifiable factors, such as carotid stenosis atrial fibrillation, as the cause of ischemic symptoms.[41] Diagnostic recommendations include neuroimaging evaluation as soon as possible, preferably with magnetic resonance imaging, including DWI; noninvasive imaging of the extracranial vessels should be performed, and noninvasive imaging of intracranial vessels is reasonable.[30]

Patients with a history of stroke and recent work up with new signs or symptoms indicating progression or complications of the initial CVA should have repeat brain imaging as an initial study. Patients with remote or silent strokes discovered on imaging should be evaluated for high-risk modifiable risk factors based on the location and type of the presumed etiology of the brain injury.[30, 40-43]

REFERENCES

1. Adla T, Adlova R. Multimodality Imaging of Carotid Stenosis. *Int J Angiol*. Sep 2015;24(3):179-84. doi:10.1055/s-0035-1556056
2. Robertson RL, Palasis S, Rivkin MJ, et al. ACR Appropriateness Criteria® Cerebrovascular Disease-Child. *J Am Coll Radiol*. May 2020;17(5s):S36-s54. doi:10.1016/j.jacr.2020.01.036
3. Salmela MB, Mortazavi S, Jagadeesan BD, et al. ACR Appropriateness Criteria(®) Cerebrovascular Disease. *J Am Coll Radiol*. May 2017;14(5s):S34-s61. doi:10.1016/j.jacr.2017.01.051
4. Sanelli PC, Sykes JB, Ford AL, Lee JM, Vo KD, Hallam DK. Imaging and treatment of patients with acute stroke: an evidence-based review. *AJNR Am J Neuroradiol*. Jun 2014;35(6):1045-51. doi:10.3174/ajnr.A3518
5. Searls DE, Pazdera L, Korbel E, Vysata O, Caplan LR. Symptoms and signs of posterior circulation ischemia in the new England medical center posterior circulation registry. *Arch Neurol*. Mar 2012;69(3):346-51. doi:10.1001/archneurol.2011.2083
6. Yang CW, Carr JC, Futterer SF, et al. Contrast-enhanced MR angiography of the carotid and vertebrobasilar circulations. *AJNR Am J Neuroradiol*. Sep 2005;26(8):2095-101.
7. Lima Neto AC, Bittar R, Gattas GS, et al. Pathophysiology and Diagnosis of Vertebrobasilar Insufficiency: A Review of the Literature. *Int Arch Otorhinolaryngol*. Jul 2017;21(3):302-307. doi:10.1055/s-0036-1593448
8. Brott TG, Halperin JL, Abbara S, et al. 2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAIP/SCAI/SIR/SNIS/SVM/SVS guideline on the management of patients with extracranial carotid and vertebral artery disease: executive summary. A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, and the American Stroke Association, American Association of Neuroscience Nurses, American Association of Neurological Surgeons, American College of Radiology, American Society of Neuroradiology, Congress of Neurological Surgeons, Society of Atherosclerosis Imaging and Prevention, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of NeuroInterventional Surgery, Society for Vascular Medicine, and Society for Vascular Surgery. *Circulation*. Jul 26 2011;124(4):489-532. doi:10.1161/CIR.0b013e31820d8d78
9. DaCosta M, Tadi P, Surowiec SM. Carotid Endarterectomy. StatPearls Publishing Updated July 25, 2022. Accessed January 29, 2023. https://www.ncbi.nlm.nih.gov/books/NBK470582/
10. Marquardt L, Geraghty OC, Mehta Z, Rothwell PM. Low risk of ipsilateral stroke in patients with asymptomatic carotid stenosis on best medical treatment: a prospective, population-based study. *Stroke*. Jan 2010;41(1):e11-7. doi:10.1161/strokeaha.109.561837
11. Chaturvedi S, Bruno A, Feasby T, et al. Carotid endarterectomy--an evidence-based review: report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology*. Sep 27 2005;65(6):794-801. doi:10.1212/01.wnl.0000176036.07558.82

12. Rerkasem K, Rothwell PM. Carotid endarterectomy for symptomatic carotid stenosis. *Cochrane Database Syst Rev*. Apr 13 2011;(4):Cd001081. doi:10.1002/14651858.CD001081.pub2
13. Hayes SN, Kim ESH, Saw J, et al. Spontaneous Coronary Artery Dissection: Current State of the Science: A Scientific Statement From the American Heart Association. *Circulation*. May 8 2018;137(19):e523-e557. doi:10.1161/cir.0000000000000564
14. Hitchcock E, Gibson WT. A Review of the Genetics of Intracranial Berry Aneurysms and Implications for Genetic Counseling. *J Genet Couns*. Feb 2017;26(1):21-31. doi:10.1007/s10897-016-0029-8
15. Macaya F, Moreu M, Ruiz-Pizarro V, et al. Screening of extra-coronary arteriopathy with magnetic resonance angiography in patients with spontaneous coronary artery dissection: a single-centre experience. *Cardiovasc Diagn Ther*. Jun 2019;9(3):229-238. doi:10.21037/cdt.2019.04.09
16. MacCarrick G, Black JH, 3rd, Bowdin S, et al. Loeys-Dietz syndrome: a primer for diagnosis and management. *Genet Med*. Aug 2014;16(8):576-87. doi:10.1038/gim.2014.11
17. Aulino JM, Kirsch CFE, Burns J, et al. ACR Appropriateness Criteria(®) Neck Mass-Adenopathy. *J Am Coll Radiol*. May 2019;16(5s):S150-s160. doi:10.1016/j.jacr.2019.02.025
18. Nguyen RP, Shah LM, Quigley EP, Harnsberger HR, Wiggins RH. Carotid body detection on CT angiography. *AJNR Am J Neuroradiol*. Jun-Jul 2011;32(6):1096-9. doi:10.3174/ajnr.A2429
19. Aghayev A, Steigner ML, Azene EM, et al. ACR Appropriateness Criteria® Noncerebral Vasculitis. *J Am Coll Radiol*. Nov 2021;18(11s):S380-s393. doi:10.1016/j.jacr.2021.08.005
20. Abdel Razek AA, Alvarez H, Bagg S, Refaat S, Castillo M. Imaging spectrum of CNS vasculitis. *Radiographics*. Jul-Aug 2014;34(4):873-94. doi:10.1148/rg.344135028
21. Halbach C, McClelland CM, Chen J, Li S, Lee MS. Use of Noninvasive Imaging in Giant Cell Arteritis. *Asia Pac J Ophthalmol (Phila)*. Jul-Aug 2018;7(4):260-264. doi:10.22608/apo.2018133
22. Khan A, Dasgupta B. Imaging in Giant Cell Arteritis. *Curr Rheumatol Rep*. Aug 2015;17(8):52. doi:10.1007/s11926-015-0527-y
23. Koster MJ, Matteson EL, Warrington KJ. Large-vessel giant cell arteritis: diagnosis, monitoring and management. *Rheumatology (Oxford)*. Feb 1 2018;57(suppl_2):ii32-ii42. doi:10.1093/rheumatology/kex424
24. Potter BJ, Pinto DS. Subclavian steal syndrome. *Circulation*. Jun 3 2014;129(22):2320-3. doi:10.1161/circulationaha.113.006653
25. Franz RW, Willette PA, Wood MJ, Wright ML, Hartman JF. A systematic review and meta-analysis of diagnostic screening criteria for blunt cerebrovascular injuries. *J Am Coll Surg*. Mar 2012;214(3):313-27. doi:10.1016/j.jamcollsurg.2011.11.012
26. Shakir HJ, Davies JM, Shallwani H, Siddiqui AH, Levy EI. Carotid and Vertebral Dissection Imaging. *Curr Pain Headache Rep*. Dec 2016;20(12):68. doi:10.1007/s11916-016-0593-5
27. Travis Caton M, Jr., Miskin N, Guenette JP. The role of computed tomography angiography as initial imaging tool for acute hemorrhage in the head and neck. *Emerg Radiol*. Apr 2021;28(2):215-221. doi:10.1007/s10140-020-01835-9
28. Kim JD, Hashemi N, Gelman R, Lee AG. Neuroimaging in ophthalmology. *Saudi J Ophthalmol*. Oct 2012;26(4):401-7. doi:10.1016/j.sjopt.2012.07.001

29. Pegge SAH, Steens SCA, Kunst HPM, Meijer FJA. Pulsatile Tinnitus: Differential Diagnosis and Radiological Work-Up. *Curr Radiol Rep*. 2017;5(1):5. doi:10.1007/s40134-017-0199-7
30. Wintermark M, Sanelli PC, Albers GW, et al. Imaging recommendations for acute stroke and transient ischemic attack patients: A joint statement by the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery. *AJNR Am J Neuroradiol*. Nov-Dec 2013;34(11):E117-27. doi:10.3174/ajnr.A3690
31. Larsson SC, King A, Madigan J, Levi C, Norris JW, Markus HS. Prognosis of carotid dissecting aneurysms: Results from CADISS and a systematic review. *Neurology*. Feb 14 2017;88(7):646-652. doi:10.1212/wnl.0000000000003617
32. Patel SD, Haynes R, Staff I, Tunguturi A, Elmoursi S, Nouh A. Recanalization of cervicocephalic artery dissection. *Brain Circ*. Jul-Sep 2020;6(3):175-180. doi:10.4103/bc.bc_19_20
33. Güneyli S, Ceylan N, Bayraktaroğlu S, Acar T, Savaş R. Imaging findings of vascular lesions in the head and neck. *Diagn Interv Radiol*. Sep-Oct 2014;20(5):432-7. doi:10.5152/dir.2014.14004
34. American College of Radiology. ACR Appropriateness Criteria®Cerebrovascular Disease. American College of Radiology (ACR). Updated 2016. Accessed February 8, 2023. https://acsearch.acr.org/docs/69478/Narrative/
35. American College of Radiology. ACR Appropriateness Criteria® Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. American College of Radiology (ACR). Updated 2021. Accessed February 8, 2023. https://acsearch.acr.org/docs/3149013/Narrative/
36. Liang T, Tso DK, Chiu RY, Nicolaou S. Imaging of blunt vascular neck injuries: a review of screening and imaging modalities. *AJR Am J Roentgenol*. Oct 2013;201(4):884-92. doi:10.2214/ajr.12.9664
37. Mundinger GS, Dorafshar AH, Gilson MM, Mithani SK, Manson PN, Rodriguez ED. Blunt-mechanism facial fracture patterns associated with internal carotid artery injuries: recommendations for additional screening criteria based on analysis of 4,398 patients. *J Oral Maxillofac Surg*. Dec 2013;71(12):2092-100. doi:10.1016/j.joms.2013.07.005
38. Simon LV, Nassar AK, Mohseni M. Vertebral Artery Injury. StatPearls Publishing Updated July 18, 2022. Accessed January 29, 2023. https://www.ncbi.nlm.nih.gov/books/NBK470363/
39. Nash M, Rafay MF. Craniocervical Arterial Dissection in Children: Pathophysiology and Management. *Pediatr Neurol*. Jun 2019;95:9-18. doi:10.1016/j.pediatrneurol.2019.01.020
40. Sacco RL, Kasner SE, Broderick JP, et al. An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. Jul 2013;44(7):2064-89. doi:10.1161/STR.0b013e318296aeca
41. Kernan WN, Ovbiagele B, Black HR, et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. Jul 2014;45(7):2160-236. doi:10.1161/str.0000000000000024

42. Easton JD, Saver JL, Albers GW, et al. Definition and evaluation of transient ischemic attack: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association Stroke Council; Council on Cardiovascular Surgery and Anesthesia; Council on Cardiovascular Radiology and Intervention; Council on Cardiovascular Nursing; and the Interdisciplinary Council on Peripheral Vascular Disease. The American Academy of Neurology affirms the value of this statement as an educational tool for neurologists. *Stroke*. Jun 2009;40(6):2276-93. doi:10.1161/strokeaha.108.192218
43. Hong KS, Yegiaian S, Lee M, Lee J, Saver JL. Declining stroke and vascular event recurrence rates in secondary prevention trials over the past 50 years and consequences for current trial design. *Circulation*. May 17 2011;123(19):2111-9. doi:10.1161/circulationaha.109.934786

POLICY HISTORY

Date	Summary
May 2023	Updated References Added • For further evaluation of a congenital vascular malformation of the head and neck • Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment (Combo Neck/Brain CTA) • Section on further evaluation of indeterminate or questionable findings on prior imaging • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline
March 2022	Updated and reformatted references Expanded background on CTA vs MRA Clarified • Pulsatile tinnitus to identify a suspected arterial vascular etiology • Large vessel vasculitis with suspected extracranial involvement Added: • To identity an arterial source of bleeding in patients with hemorrhage of the head and neck • New Combo statement

Reviewed / Approved by NIA Clinical Guideline Committee

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