National Imaging Associates, Inc.*	
Clinical guidelines **NECK MRA/MRV**	**Original Date: September 1997**
CPT Codes: 70547, 70548, 70549	**Last Revised Date: April 2021**
Guideline Number: NIA_CG_012-2	**Implementation Date: January 2022**

INDICATIONS FOR NECK MRA

For evaluation of known or suspected extracranial vascular disease

Cerebrovascular Disease

- Recent ischemic stroke or transient ischemic attack (**Robertson, 2020; Salmela**~~ACR~~, 2017~~;~~ ~~2019~~20~~;~~ Sanelli, 2014)~~.~~
- **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** (~~Yang, 2005;~~ **Lima-Neto, 2017; Searls, 2012; Yang, 2005**)~~.~~

- 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) (Brott, 2011; DaCosta, 2019; Marquardt, 2010)~~.~~
- 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) **(**B~~AAN; 2010; B~~rott, 2011; **Chaturvedi, 2005**; Rerkasem, 2011)

Aneurysm screening

- **Screening for aneurysm in Loeys-Dietz syndrome**, fibromuscular dysplasia or spontaneous coronary arteries dissection (SCAD) (Hayes, 2018; Hitchock, 2014; Macaya, 2019; MacCarrick, 2014)~~.~~**
  **** For Loey~~z~~s-Dietz imaging should be repeated at least every two years**
  ~~Screening for aneurysm in fibromuscular dysplasia or spontaneous coronary arteries dissection (SCAD) (Hayes, 2018; Hitchcock, 2014; Macaya, 2019).~~

Tumor/pulsatile mass

- Pulsatile mass on exam ~~after Ultrasound (US)~~ **(Aulino, 2019)**

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- Known ~~C~~carotid body tumors, or other masses such as a paraganglioma, arteriovenous fistula, pseudoaneurysm, atypical lymphovascular malformation (~~Nguyen, 2011;~~ **Al-Rawaq, 2018; Nguyen, 2011**)~~.~~
  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

- Takayasu arteritis based on findings in other blood vessels on previous imaging (Zhu, 2012)
- Giant cell arteritis **with suspected extracranial involvement** (Abdel Razek, 2014; **Halbach, 2018; Khan, 2015;** Koster, 2018~~); Khan, 2015; Halbach, 2018)~~)
- Subclavian steal syndrome when ultrasound is positive or indeterminate ~~or~~**OR** for planning **an** intervention~~s~~ (Potter, 2014)
- Suspected carotid or vertebral artery dissection; due to trauma or spontaneous due to weakness of vessel wall ~~leading to dissection~~ (Franz, 2012; Shakir, 2016)
- Horner's syndrome (miosis, ptosis, and anhidrosis) (Kim, 2012)
- **For evaluation of pulsatile tinnitus (subjective or objective) for vascular etiology (Pegge, 2017)**
- Known extracranial vascular disease that needs follow-up or further evaluation

Pre-operative/procedural evaluation

- **Pre-operative evaluation for a planned surgery or procedure** ~~if the imaging provides diagnostic information that is not available on prior studies (provider should be referred to the health plan for nondiagnostic surgical planning studies).~~
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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.

INDICATIONS FOR COMBINATION STUDIES

Neck MRA/Brain MRA

- Recent ischemic stroke or transient ischemic attack (TIA) (**Robertson, 2020; Salmela, 2017**~~ACR, 2017, 2019~~; Wintermark, 2013)
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia~~, and~~ weakness in both sides of the body, or abnormal speech (Lima-Neto, 2017; Searls, 2012)~~.~~
- Suspected carotid or vertebral artery dissection~~;~~ due to trauma or spontaneous due to weakness of vessel wall ~~leading to dissection~~ (Franz, 2012; Shakir, 2016)~~.~~
- Asymptomatic patients with an abnormal ultrasound of the neck or carotid duplex imaging (e.g.~~,~~ internal carotid stenosis > 70%, technically limited study, aberrant direction of flow in

the carotid or vertebral arteries) and patient is surgery or angioplasty candidate (Brott, 2011; DaCosta, 2019; Marquardt, 2010)
- 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 (Brott, 2011; DaCosta, 2019; Rerkasem, 2011)
- For evaluation of pulsatile tinnitus (subjective or objective) for vascular etiology (Pegge, 2017)

Neck MRA/Brain MRA/Brain MRI
- Recent ischemic stroke or transient ischemic attack
- Suspected carotid or vertebral artery dissection with focal or lateralizing neurological deficits
- **Approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent vascular and intracranial pathology (Lawson, 2000).**

BACKGROUND

For vascular disease, in general, MRA and CTA are comparable. There is noNo current literature comparing compares the efficacy of contrast enhanced CT to CTA or MRI and MRA for evaluation of pulsatile neck mass, so any are approvable. MRA may be complementary to MRI 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 (ACR, 2015Ansari, 20206).

MRA and Carotid Body Tumor – Carotid body tumors are found in the upper neck at the branching of the carotid artery. Although most of them are benign, they may be locally aggressive with a small malignant potential. MRA may be used to identify a carotid body tumor due to its ability to define the extension of the tumor in relation to the carotid arteries, involvement of the base of the skull and bilateral tumors.

MRA 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 (Franz, 2012; Liang, 2013; Mundinger, 2013; Simon, 2019). Spontaneous dissection presents with headache, neck pain with neurological signs or symptoms.

There is often minor trauma or precipitating factor (~~ie~~ **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 (Nash, 2019; Shakir, 2016).

Post-operative evaluation of carotid endarterectomy – Carotid endarterectomy is a vascular surgical procedure that removes plaque from the carotid artery. MRA with multiprojection volume reconstruction is a non-invasive imaging modality that is an alternative to postoperative angiography following carotid endarterectomy. It allows the surgeon to get informative and comparative data.

MRA 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~~"~~ (Sacco, 2013)." 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 (Kernan, 2014). 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~~"~~ (Easton, 2009)." 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 (Hong, 2011).

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 >or=3, indicating high risk of early recurrence, or the evaluation cannot be rapidly completed on an outpatient basis ~~(~~(Easton, 2009). 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 (Kernan, 2014). 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 (Wintermark, 2013).

Patients with a history of stroke and recent ~~work~~ 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.

POLICY HISTORY

Date	Summary
~~April~~ May 2021	Updated references Added Loeys-Dietz syndrome to aneurysm screening section • • Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia and weakness in both sides of the body, or abnormal speech – which was before only in the combo section • Note: Ultrasound (US) may be used to identify a mass overlying or next to an artery in initial work up of a pulsatile mass. • For evaluation of pulsatile tinnitus (subjective or objective) for vascular etiology - which was before only in the combo section • Pre-operative evaluation for a planned surgery or procedure ~~if the imaging provides diagnostic information that is not available on prior studies (provider should be referred to the health plan for nondiagnostic surgical planning studies).~~ • Approved indications as noted above and being performed in a child under 8 years of age who will need anesthesia for the procedure and there is a suspicion of concurrent vascular and intracranial pathology (Lawson, 2000). Clarified • ~~•~~ Giant cell arteritis *with suspected extracranial involvement* Deleted*:* • After US (for pulsatile neck mass)
May 2020	Clarified: • Recent ischemic stroke or transient ischemic attack (also in combo section) • Pulsatile mass on exam after ultrasound (US) • Takayasu arteritis based on findings in other blood vessels on previous imaging • Giant cell arteritis • Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia,

	blindness, vomiting, ataxia and weakness in both sides of the body, or abnormal speech • Suspected carotid or vertebral artery dissection; due to trauma or spontaneous due to weakness of vessel wall leading to dissection (combo section) Deleted: • Ehlers-Danlos syndrome and neurofibromatosis in screening for aneurysm Added: • Spontaneous coronary arteries dissection (SCAD) in screening for aneurysm • Suspected carotid or vertebral artery dissection; due to trauma or spontaneous due to weakness of vessel wall leading to dissection • Horner's syndrome (miosis, ptosis, and anhidrosis) • Known extracranial vascular disease that needs follow-up or further evaluation
April 2019	• Suspected or known disease: Added "Giant cell arteritis" and "Subclavian steal syndrome when ultrasound is positive or indeterminate or for planning interventions • "Known or suspected tumor/*pulsatile* mass": Added 'pulsatile'; • Neck MRA/Brain MRA: Added Denver screening criteria to assess for cerebrovascular injury • Added background information describing MRA and CTA as complimentary information to MRI or CT

~~April 2019~~

- ~~Suspected or known disease: Added "Giant cell arteritis" and "Subclavian steal syndrome when ultrasound is positive or indeterminate or for planning interventions~~
- ~~"Known or suspected tumor/*pulsatile* mass": Added 'pulsatile';~~
- ~~Neck MRA/Brain MRA: Added Denver screening criteria to assess for cerebrovascular injury~~
- ~~Added background information describing MRA and CTA as complimentary information to MRI or CT~~

~~May 2020~~

~~Clarified:~~

- ~~Recent **ischemic** stroke or transient ischemic attack (also in combo section)~~
- ~~Pulsatile mass on exam after ultrasound (US)~~
- ~~Takayasu arteritis based on findings in other blood vessels on previous imaging~~
- ~~Giant cell arteritis~~
- ~~Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia and weakness in both sides of the body, or abnormal speech~~
- ~~Suspected carotid or vertebral artery dissection; due to trauma or spontaneous due to weakness of vessel wall leading to dissection (combo section)~~

~~Deleted:~~

- ~~Ehlers-Danlos syndrome and neurofibromatosis in screening for aneurysm~~

~~Added:~~

- ~~Spontaneous coronary arteries dissection (SCAD) in screening for aneurysm~~
- ~~Suspected carotid or vertebral artery dissection; due to trauma or spontaneous due to weakness of vessel wall leading to dissection~~
- ~~Horner's syndrome (miosis, ptosis, and anhidrosis)~~
- ~~Known extracranial vascular disease that needs follow-up or further evaluation~~

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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.