Service: Magnetic Resonance Angiography (MRA) and Magnetic Resonance Venography (MRV)

The content of this document is used by WPS plans that do not utilize NIA review

PUM 250-0027-1712

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<td>04/01/19</td>
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Description:

Magnetic Resonance Angiography (MRA) and Magnetic Resonance Venography (MRV) use Magnetic resonance imaging (MRI) technology to produce detailed 2-dimensional or 3-dimensional images of the vascular system and may be tailored to assess arteries or veins. It is often used for vascular conditions where other types of imaging are considered inferior or contraindicated, and to decrease risk of cumulative radiation exposure.

Note: Pediatric indications are listed in section B. of this medical policy.

Indications of Coverage:

A. MRA/MRV is considered medically necessary for the anatomical regions listed below when the specific indications or symptoms described are documented:

1. Head/Brain
   a. Suspected intracranial aneurysm (ICA) or arteriovenous malformation (AVM). Either:
1. Acute severe headache, severe exertional headache, or sudden onset of explosive headache, in individuals with signs / symptoms highly suggestive of a leaking/ruptured internal carotid artery or arteriovenous malformation.

OR

2. Diagnosis of intracranial or subarachnoid hemorrhage (SAH) or previously diagnosed SAH.

b. Follow up of known intracranial aneurysm (ICA). MRA is considered medically necessary for any of the following:

1. To evaluate a known non-ruptured intracranial aneurysm. Follow up MRA is considered medically necessary initially at 6 months following detection, then annually for 2 to 3 years, then every 2 to 5 years, provided the aneurysm is clinically and radiographically stable.

2. To follow up known ICA with persistent symptoms (e.g. ominous headache, focal neurologic findings, change in mental status, seizures).

3. To evaluate an aneurysm that is clinically or radiographically unstable.

c. To screen for possible ICA in a patient who is at higher risk, as indicated by having one or more of the following:

1. History of ICA in a first degree relative (mother, father, sibling, child)*

2. Personal history of:
   a. Ehlers-Danlos syndrome
      or
   b. Autosomal dominant polycystic kidney disease
      or
   c. Fibromuscular dysplasia
      or
   d. Neurofibromatosis
      or
   e. Known coarctation of the aorta

➢ *Repeat study may be approved every 5 years (with or without new symptoms) if criteria for first degree family history is met.

d. Follow-up of known arteriovenous malformation (AVM). Either of the following:
1. Follow-up of AVM initially at 6 months following detection, then annually for 2 to 3 years, then every 2 to 5 years, provided the AVM is clinically and radiographically stable.

2. Follow up of known AVM with persistent symptoms (e.g. ominous headache, focal neurologic findings, change in mental status, seizures).

3. To evaluate an AVM that is clinically or radiographically unstable.

e. To evaluate **known or suspected vertebrobasilar insufficiency (VBI)**. Symptoms suggestive of VBI may include temporary or permanent binocular vision loss, double vision, positional vertigo, irregularities in speech (slurred/slowed/limited), difficulties swallowing, loss of co-ordination, and confusion.

f. To evaluate **pulsatile tinnitus** in patients with symptoms suggestive of a vascular etiology.

g. For evaluation of **known vasculitis**.

h. For evaluation of **suspected vasculitis** when autoimmune antibodies are present or when abnormal lab results such as elevated C-reactive protein (CRP) or erythrocyte sedimentation rate (ESR) suggest acute inflammation.

i. For follow up **after treatment of aneurysm** (e.g. coiling, embolization). Repeat study may be approved every 6 months for the first 2 years while the aneurysm is clinically and radiographically stable. Repeat MRA after the first 2 years requires physician review. Repeated MRAs for situations in which an aneurysm is clinically or radiographically unstable, may require physician review.

j. Preoperative planning for delineation of vascular supply of vascular neoplasm.

k. Preoperative planning or confirmation of diagnosis for vascular malformation of brain or skull base.

l. For suspected intracranial disease or stenosis in patients with signs/symptoms of stroke or transient ischemic attack (TIA) within the past 2 weeks (includes suspected carotid or cerebral artery occlusion). May be performed in conjunction with MRA neck.

m. To evaluate known or suspected venous thrombosis (dural sinus thrombosis, cerebral venous sinus thrombosis).
n. Distinguishing between benign intracranial hypertension (pseudotumor cerebri) from dural sinus thrombosis.

o. For evaluation of new or fluctuating neurologic symptoms: Acute, new or fluctuating neurologic symptoms or deficits such as sensory deficits, limb weakness, speech difficulties, lack of coordination or mental status changes.

p. For evaluation of neurological findings in sickle cell disease in patients over age 16. See also pediatric indications (Section B).

2. Neck:

   a. For evaluation of carotid stenosis or occlusion in a symptomatic individual after an abnormal Doppler ultrasound showing one of the following:
      1) Stenosis (equal to or greater than 50%) of the internal carotid artery or the common carotid artery
      2) Reversal of flow in the carotid or vertebral artery
      3) An inconclusive or technically inadequate study

   b. For evaluation of carotid stenosis or occlusion in an asymptomatic individual after an abnormal Doppler ultrasound showing one of the following:
      1) Stenosis (equal to or greater than 70%) of the internal carotid artery or the common carotid artery
      2) Reversal of flow in the carotid or vertebral artery
      3) An inconclusive or technically inadequate study

   c. For evaluation of an individual with closed head injury, penetrating neck injury, or blunt head or neck trauma for suspected carotid or vertebral artery dissection or traumatic arterial injury.

   d. For evaluation of carotid body tumors, or other paragangliomas.

   e. For evaluation of pulsatile neck mass and/or pulsatile tinnitus.

   f. Postoperative evaluation following carotid endarterectomy: Documentation requires a medical reason clearly indicating why the MRA, rather than ultrasound, is required.

   g. Suspected carotid or vertebral aneurysm, dissection, thromboembolism, or congenital anomaly of carotid or vertebrobasilar circulation.
h. For evaluation of new onset stroke or transient ischemic attack (TIA).

3. **Combined Neck MRA and Head/Brain MRA studies.** Any of the following:

   a. For evaluation of patients who have had a stroke or transient ischemic attack (TIA) within the past 2 weeks.

   b. For evaluation of known or suspected carotid or cerebral artery disease in patients with a sudden onset of one-sided weakness, abnormal speech, vision defects or severe dizziness.

   c. For suspected vertebral basilar insufficiency with symptoms such as vision changes, vertigo, or abnormal speech.

   d. For evaluation of closed head or neck trauma for suspected carotid or vertebral artery dissection or arterial injury.

   e. For evaluation of pulsatile tinnitus.

4. **Chest: Any of the following:**

   a. For diagnosis, treatment planning, and post-operative follow-up of conditions of the thoracic aorta, heart or thoracic vasculature, when echocardiography results are indeterminate, or when additional imaging is required for management decisions. These conditions may be congenital or acquired, and may include any of the following:

      1. Aortic arch abnormalities, vascular rings, bicuspid aortic valve, or congenital aortic abnormalities.

      2. Coarctation of the thoracic aorta

      3. Pulmonary vein or artery anomalies

      4. Suspected pulmonary arteriovenous malformation (AVM) or arteriovenous fistula (AVF)

      5. Congenital heart disease [for example, patent ductus arteriosus (PDA), truncus arteriosus, atrial or ventricular septal defects (ASD, VSD), patent foramen ovale (PFO)]

      6. Coronary artery aneurysm
7. Thoracic or thoracoabdominal aneurysm or dissection (imaging above and below the diaphragm)

b. For preoperative evaluation of the pulmonary veins and left atrium for radiofrequency ablation treatment of atrial fibrillation.

c. For diagnosing a suspected or known pulmonary embolism when computed tomography angiography (CTA) is contraindicated.

d. For evaluation of signs or symptoms indicative of vascular insufficiency of the neck or arms, such as subclavian steal syndrome or thoracic outlet syndrome.

e. For follow-up evaluation of new signs or symptoms indicative of progressive vascular stenosis after a previous angiogram or MRA.

f. For treatment planning for evaluation for known or suspected vascular disease, (such as aneurysm, dissection, or stenosis/occlusion) and patient has not had a catheter angiogram or computed tomography angiography (CTA) within the last month.

g. For postoperative evaluation for known vascular disease with physical evidence of a re-bleed or re-stenosis.

h. For evaluation of suspicious mass and CTA is contraindicated.

i. For evaluation of a mediastinal or thoracic mass with suspected vascular involvement.

j. For evaluation of primary or secondary pulmonary hypertension.

k. For evaluation of suspected pulmonary sequestration.

l. For evaluation of central venous thrombosis.

5. Abdomen and / or Pelvis

a. To evaluate for renal artery stenosis when one of the following is documented:

   1. Refractory, uncontrolled hypertension (HTN) despite optimal doses of three (3) or more blood pressure medications.
2. Onset of HTN in patient younger than 30 years old, with no other risk factors and no other family history of HTN.

3. Onset HTN at age greater than 50 years old.

4. Unexplained renal failure (only if ultrasound is inconclusive).

5. Hypertension with bruit heard over the renal artery.

b. For evaluation of aortic aneurysm, to include preoperative/pre-procedural evaluation for abdominal aortic aneurysm (AAA) repair, whether surgical or endovascular.

c. Follow up of iliac artery aneurysm: Six month follow up if aneurysm is between 3.0-3.5 cm and, if stable, followed yearly. If aneurysm is greater than 3.5 cm, less than six month follow up (e.g. considering intervention).

d. Acute rise in blood pressure in a person with previously stable blood pressures.

e. Flash pulmonary edema without identifiable causes.

f. Malignant hypertension.

g. To evaluate for mesenteric ischemia/ischemic colitis when CTA (computed tomography angiography) is contraindicated, or results are indeterminate.

h. To evaluate suspected renal vein thrombosis in patients with known renal mass.

i. To further evaluate hepatic vascular abnormalities (e.g. aneurysm, venous thrombosis, stenosis, or obstruction in the portal or hepatic veins (portal venous thrombosis or Budd-Chiari syndrome) or systemic veins, such as inferior vena cava, renal veins, or iliac veins after indeterminate or equivocal ultrasound.

j. To evaluate hepatic vasculature prior to transjugular intrahepatic portosystemic shunt (TIPS) procedure after indeterminate or equivocal ultrasound.

k. For evaluation, surgical or treatment planning of abdominal–pelvic vascular injury (e.g. pelvic trauma).

l. To assess for arterial stenosis or occlusion in the aorta, pelvic vessels and lower extremity vessels in patients with signs or symptoms of peripheral vascular disease / claudication and ultrasound ankle brachial index (ABI) of less than
0.9. This is commonly performed as MRA abdomen, pelvis, and lower extremities.

m. Suspected retroperitoneal hematoma or hemorrhage to determine vascular source of hemorrhage in trauma, tumor invasion, vasculitis, or fistula.

n. For evaluation of known or suspected vascular disease. Any of the following:
   1. Arterial entrapment syndrome.
   2. Large vessel diseases, e.g., aneurysm, dissection, arteriovenous malformations (AVMs), and fistulas, intramural hematoma, and vasculitis.
   3. Pelvic vein thrombosis or thrombophlebitis.
   4. Vascular invasion or displacement by tumor.
   5. Venous thrombosis if previous studies have not resulted in a clear diagnosis.
   6. Suspected pelvic vascular disease such as pelvic congestion syndrome when findings on ultrasound are indeterminate

o. Pre-operative evaluation for any of the following:
   1. Evaluation of aortoiliac occlusion, stenosis or peripheral vascular disease of the leg and ankle brachial index (ABI) is less than 0.9.
   2. Pre-transplant evaluation of the liver, to include both donor and recipient evaluation.
   3. Pre-transplant evaluation of the kidney, to include both donor and recipient evaluation.
   4. Evaluation of interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia.

p. Post-operative evaluation for any of the following:
   1. Evaluation of endovascular or interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia or graft leakage. Postoperative
surveillance after endovascular repair of abdominal aortic aneurysm (AAA) in an asymptomatic patient may be considered medically necessary every 6 months until 1 year after the procedure, then annually.

2. Evaluation of post-operative complications, e.g. pseudoaneurysms, related to surgical bypass grafts, vascular stents and stent-grafts.

3. Follow-up study may be needed to help evaluate a patient’s progress after treatment, procedure, intervention or surgery. Documentation must include clear indication of why additional imaging is needed for the type and area(s) requested.

q. To evaluate individual less than or equal to 35 years old with significant hypertension (diastolic blood pressure of greater than 110 mmHg) suggestive of fibromuscular dysplasia.

r. To evaluate individual with known diagnosis of neurofibromatosis or tuberous sclerosis, or Williams syndrome, with associated higher incidence of vascular disease.

s. To evaluate abdominal and/or pelvic extent of aortic dissection.

6. **Spinal Canal:** for the evaluation of any of the following:

   a. Cervical spine fracture, disc herniation, venous thrombosis, or infection when there is concern for vascular injury or compromise.

   b. Known or suspected vertebral artery injury.

   c. Known or suspected spinal arteriovenous malformation (AVM) or arteriovenous fistula (AVF), to include myelopathy with suspected vascular compromise.

   d. Subarachnoid hemorrhage, and no source of bleed identified on other-imaging.

   e. Preoperative evaluation in which localization of the spinal arteries is essential.

7. **Extremities**

   a. **Upper Extremity:**

      1. For evaluation of suspected or known upper extremity arterial compromise or venous thrombosis, vascular abnormality of upper extremity (e.g., arteriovenous malformation, fistula, fibromuscular dysplasia, aneurysm,
vasculitis, vascular compression by adjacent masses, subclavian vein thrombosis, subclavian steal syndrome, thoracic outlet syndrome, embolism or thrombosis, intramural hematoma, Raynaud’s Syndrome).

2. For pre-operative evaluation of known vascular disease or condition with indeterminate ultrasound.

3. To evaluate suspected traumatic injury to the vasculature of upper extremity when site and extent of injury are not obvious or there are clinical findings suggestive of arterial injury.

4. Post-surgical or post-vascular interventional procedure to assess luminal patency/restenosis or complication such as pseudoaneurysms.

b. **Lower Extremity:**

1. For diagnosis and surgical planning in the treatment of peripheral vascular disease of the lower extremity including arterial insufficiency, ischemia, claudication, suspected vascular abnormality (e.g. A/V malformation, fistula, intramural hematoma, vasculitis, compression by adjacent mass, pelvic vein thrombosis, arterial entrapment syndrome, peripheral arterial disease with foot ulcer). MRA is considered medically necessary for evaluating suspected peripheral vascular disease only if the ankle brachial index (ABI) is less than 0.9 in one of the extremities.

2. For post-operative/ post procedure evaluation for luminal patency vs restenosis, or for complications such as pseudoaneurysm related to bypass grafts, vascular stents, and stent-grafts.

3. To evaluate suspected traumatic vascular injury in the lower extremity when site and extent of injury are not obvious or there are clinical findings suggestive of arterial injury.

4. For evaluation of suspected venous thrombosis, or venous compromise, only if extremity ultrasound has been performed and is indeterminate or inconclusive.

5. For pre-operative evaluation for known vascular disease or condition with indeterminate ultrasound.
B. **Pediatric MRA/MRV** is considered medically necessary for assessing the following situations:


2. Aortic, pulmonary arterial, and branch vessel vasculopathies, in the setting of a known or suspected syndrome (e.g. Marfan syndrome, mid aortic syndrome, neurofibromatosis type 1, and Williams syndrome).

3. Vasculitis and collagen vascular disease

4. Arterial dissection

5. Aneurysms or pseudoaneurysms, and venous varices

6. Renovascular hypertension

7. Mesenteric ischemia

8. Moyamoya disease

9. Evaluation of etiology of intracranial hemorrhage and intraspinal hemorrhage

10. Vascular malformations trunk and extremity

11. Vascular abnormalities associated with sickle cell anemia

12. Central and peripheral venous occlusive disease

13. Congenital venous anomalies

14. Presence of venous thrombosis, including caval, portal, mesenteric, or splenic vein

15. Blood supply to vascular neoplasms for operative planning

16. Vascular anastomoses and complications of organ transplants

17. Postoperative anatomy following vascular surgery (e.g. Intracranial Aneurysm, Arteriovenous Malformation)
18. Evaluation of surgically created dialysis fistulas and grafts with unenhanced MRA

19. Evaluation of extremity peripheral vasculature in congenital anomalies

20. Portal Hypertension

21. Thoracic Outlet syndrome

22. Cerebral arteriovenous malformations (AVMs), arteriovenous fistulas, and venous and vascular malformations

23. Vascular status following extracorporeal membrane oxygenation

24. Acute ischemic stroke, vasospasm, and thromboembolism

25. Traumatic injury to cervicocerebral vessels, including dissection

26. Localization of arterial and venous structures for operative planning

27. Invasion, encasement, and constriction of blood vessels by neoplasm

28. Soft-tissue vascular anomalies in the head and neck region

29. Dural sinus thrombosis and intracranial venous occlusive disease

30. Atherosclerotic steno-occlusive disease

31. Nonatherosclerotic, noninflammatory vasculopathy

32. To evaluate stroke risk (e.g. consider transfusion therapy treatment) in sickle cell patients (2-16 years of age) with a transcranial Doppler velocity greater than 200. For older adolescents, see Brain MRA.

C. **MRA** is considered medically necessary when CTA or catheter angiography is clinically indicated, however is contraindicated due to:

1. Allergy to iodinated contrast
2. Renal insufficiency or failure
3. Pregnancy
Limitations of Coverage:

A. Review contract and endorsements for exclusions and prior authorization or benefit requirements.

B. If used for a condition/diagnosis other than is listed in the Indications of Coverage, it will be denied as experimental or investigative.

C. If used for a condition/diagnosis that is listed in the Indications of Coverage, but the criteria are not met, it will be denied as not medically necessary.

D. MRA Head is considered not medically necessary in any of the following situations:

1. For evaluation of migraine or recurrent headache when there has been a normal neurological evaluation.

2. Chronic headache due to suspected sinusitis.

3. Chronic headache or evaluating/monitoring a history of headache in the absence of documented clinical concern for headache etiologies listed in Indications of Coverage A.1.a.

4. Pre-operative or pre-procedural carotid endarterectomy planning.

5. For evaluation of trigeminal neuralgia.

E. MRA Neck is considered not medically necessary when performed for routine follow up after carotid endarterectomy or percutaneous intervention.

F. When both catheter angiography and MRA, or CTA and MRA are performed to evaluate the same condition/anatomical region, the second test is considered not medically necessary, unless there is documentation of at least one of the following:

1. A significant change in symptoms or condition warrants the second test.

2. Previous diagnostic testing (for example, imaging and/or ultrasound) is contradictory or inconclusive.

3. Inflow and outflow blood vessels were not identified on the first exam.
G. MRV of the extremities (lower and upper) is considered not medically necessary without documentation of an inconclusive or indeterminate venous ultrasound.

H. Repeat MRA/MRV: If not specified in the indications above, repeat MRA is considered not medically necessary unless there is documentation of 1 or more of the following:

1. Change in clinical status (e.g., worsening symptoms or new associated symptoms).

2. Documentation of how interval reassessment may impact the treatment plan.

3. Documentation from the provider regarding rationale for repeated testing with documentation of the medical need for the type and location of additional testing.

Documentation Required:

- Office notes from referring/ordering physician

- Order for the MRA (a comment in the referring/ordering physician’s office notes is sufficient)

- Radiology report

WPS Review History:

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- Note: For review/revision history prior to 2014 see previous Medical Policy or Coverage Policy Bulletin

Approved by the Medical Director