Medical Affairs Policy

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

Medical Policy Committee Approval: 12/09/16
Effective Date: 01/01/17
Prior Authorization Needed: Yes

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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 perivascular anatomy without the risks usually associated with catheter angiography, including radiation exposure and arterial puncture. MRA uses Gadolinium as a contrast agent instead of iodine-based contrast agents used in conventional contrast angiography or computed tomography angiography (CTA). Allergic reactions and kidney failure are less commonly associated with Gadolinium than with iodine-based contrast agents. However, Gadolinium may cause nephrogenic systemic fibrosis in patients with moderate to severe renal failure or dysfunction. The usefulness of MRA/MRV for selected conditions has been established. It does not provide superior imaging for the evaluation of all conditions. It is often used for conditions where other types of imaging are considered inferior or contraindicated, and to decrease risk of cumulative radiation exposure.

MRA in children has gained acceptance over CTA and catheter angiography due to the risks related to catheter-based angiographic procedures, and opportunity to decrease cumulative exposure to ionizing radiation. Sedation is typically needed when MRI or MRA is performed with infants and young children.
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 ICA or AVM.
   
   2. Diagnosis of intracranial or subarachnoid hemorrhage (SAH) (typically verified with CT or MRI or lumbar puncture) 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 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

      b. Autosomal dominant polycystic kidney disease

      c. Fibromuscular dysplasia

      d. Neurofibromatosis

      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 (a noise that originates within the ear rather than from an external source usually due to irregularities in a blood vessel that passes into or close to the inner ear) in patients with symptoms suggestive of a vascular irregularity.

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.

2. Neck:

a. For evaluation of vascular disease: Carotid or vertebral artery abnormalities when one of the following situations is documented:

1. Suspected carotid or vertebral artery stenosis or occlusion in patients with signs or symptoms consistent with acute or subacute (within 2 weeks) stroke or TIA, and MRA will impact patient management. See also Combined Neck MRA/Brain MRA.

2. Dissection (separation of the arterial layers) of a carotid or vertebral artery is suspected in an individual with symptoms consistent with arterial dissection such as a unilateral headache; head, neck, or facial pain on the same side as the suspected dissection; or Horner syndrome (decreased pupil size and drooping of the upper eyelid).

3. As a one-time follow-up study to a recent (within the past twelve months), previously diagnosed arterial dissection.

4. Preoperative or pre-procedural planning for carotid endarterectomy or percutaneous intervention needed, as indicated by 1 or more of the following:

   a. Acute stroke or TIA, and intravenous thrombolytic therapy contraindicated or failed.

   b. Duplex (Doppler) scan finding of high-grade (≥60%) stenosis, narrowing, or occlusion of the common carotid artery or internal carotid artery.
c. Duplex (Doppler) scan showing abnormal vasculature (e.g. aberrant direction of flow in carotid or vertebral arteries or subclavian steal syndrome).

d. Duplex (Doppler) scan findings indeterminate

e. Duplex (Doppler) scan or clinical findings show high carotid bifurcation, loops, or kinks making ultrasound suboptimal.

f. History of neck radiation therapy

b. For evaluation of a patient with closed head injury, penetrating neck injury, or blunt neck trauma for suspected carotid or vertebral artery dissection or traumatic arterial injury.

c. For evaluation of carotid body tumors, also called paragangliomas.

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

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

f. Suspected carotid or vertebral aneurysm, dissection, thromboembolism, or congenital anomaly of carotid or vertebrobasilar circulation.

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 AVM or AVF
5. Congenital heart disease [for example, patent ductus arteriosus (PDA), truncus arteriosus, atrial or ventricular septal defects (ASD, VSD), patent foramen ovale (PFO)]
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 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 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 mass with suspected vascular involvement.

j. For evaluation of pulmonary hypertension, when it is suspected to be due to chronic thromboembolic disease, and CTA is contraindicated.

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 a maximum dose of three (3) or more blood pressure medications
   2. Onset of HTN in patient younger than age 30 years old, with no other risk factors and no other family history of HTN
   3. Onset HTN at age > 55 y/o
   4. Unexplained renal failure, only if ultrasound is inconclusive.

b. For evaluation of aortic aneurysm or preoperative evaluation for abdominal aortic aneurysm (AAA) repair or evaluating the pelvic extent of aortic dissection.

c. Suspected or known iliac artery aneurysm (>2.5 cm AND equivocal or indeterminate ultrasound results OR Prior imaging (e.g. ultrasound) demonstrating iliac artery aneurysm >2.5cm in diameter OR Follow up of iliac artery aneurysm: Six month if between 3.0-3.5 cm and if stable follow yearly.

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 chronic mesenteric ischemia when CTA is contraindicated or results are indeterminate.

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

i. To 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.

j. To evaluate hepatic vasculature prior to transjugular intrahepatic portosystemic shunt (TIPS) procedure.
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 < 0.9. This is commonly performed as MRA abdomen, pelvis, and lower extremities.

m. 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.

n. Pre-operative evaluation. Any of the following:
   1. Evaluation of aortoiliac occlusion, stenosis or peripheral vascular disease of the leg and ABI<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.

o. Post-operative evaluation:
   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 2 years after the procedure.
   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

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

   a. Cervical spine fracture.

   b. Known or suspected vertebral artery injury.

   c. Known or suspected spinal arteriovenous malformation (AVM) or arteriovenous fistula (AVF), symptoms of which may include sudden onset of myelopathy.

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

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, aneurysm, vasculitis, vascular compression by adjacent masses, subclavian vein thrombosis, subclavian steal syndrome, thoracic outlet syndrome, embolism or thrombosis, intramural hematoma, Raynauds Syndrome), trauma to vasculature of upper extremity- when site and extent of injury are not obvious, or evaluation of complications or interventional vascular procedures (e.g. pseudoaneurysms related to bypass grafts, vascular stents, or stent grafts)

   b. **Lower Extremity:**

      1. For diagnosis and surgical planning in the treatment of peripheral vascular disease of the lower extremity including arterial insufficiency, ischemia (in the presence of ulcers / gangrene), claudication, suspected vascular abnormality (e.g. A/V malformation, fistula, intramural hematoma, vasculitis, compression by adjacent mass, pelvic vein thrombosis arterial entrapment syndrome-PAD, and foot ulcer). MRA is considered medically necessary for evaluating suspected peripheral vascular disease only if the ABI is <0.9 in one of the extremities. Most commonly for evaluating peripheral vascular disease, both lower extremities are imaged simultaneously.
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.

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

B. Pediatric MRA/MRV is considered medically necessary for assessing the following situations:

1. Congenital anomalies of the aorta, coronary arteries, pulmonary vasculature, and associated branch vessels

2. Aortic, pulmonary arterial, and branch vessel vasculopathies, in the setting of a known or suspected syndrome (e.g. Marfan’s 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 (AVM))

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 >200

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 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, deny 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, deny 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 sub-arachnoid hemorrhage
   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: 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 beyond limits described above (e.g. reported rates of aneurysm/dissection recurrence and time to recurrence for the surgical/endovascular method used to treat the aneurysm)

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

References:


27. MCG Ambulatory Care 20th Edition ACG: A-0035 Chest MR Angiography (MRA)


35. UpToDate Late Recurrence of Subarachnoid hemorrhage and intracranial aneurysm. Topic last updated Jul 31, 2013 Literature review current through June 2016.


**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*