Title: Computed Tomographic Angiography (CTA) and Magnetic Resonance Angiography (MRA) of the Head, Neck, Abdomen, Pelvis, and Lower Extremities

See also: CTA and MRA of the Chest (excluding the heart)

Professional
Original Effective Date: December 15, 2008
Revision Date(s): February 10, 2011; January 1, 2012; February 5, 2014; January 13, 2016, October 1, 2016
Current Effective Date: January 13, 2016

Institutional
Original Effective Date: December 15, 2008
Revision Date(s): February 10, 2011; January 1, 2012; February 5, 2014; January 13, 2016, October 1, 2016
Current Effective Date: January 13, 2016

DESCRIPTION
Computed tomographic angiography (CTA) uses a computerized analysis of x-ray images (enhanced by contrast material injected into a peripheral vein) to visualize the blood flow in arterial and venous structures throughout the body. Radiation exposure should be taken into account when considering the use of this technology.

Magnetic resonance angiography (MRA) is a technique for imaging vascular anatomy and pathology that does not use ionizing radiation. MRA is performed using magnetic resonance imaging (MRI) machines, and vascular images may be generated either with
or without intravenous contrast agents, depending on the clinical application. However, the contrast agents used for MRA are associated with less risk of allergic reaction or nephrotoxicity than those used for conventional angiography. However, the contrast agents used for MRA are associated with less risk of allergic reaction or nephrotoxicity than those used for conventional angiography. MRA is the general term used to describe MR imaging of vascular structures, but when MR is used to image a vein instead of an artery, the term “magnetic resonance venography” (MRV) may be used. The technical capabilities of current MRA make it most suitable for evaluation of medium-to-large size vessels. In the head, this includes the Circle of Willis and major posterior circulation vessels, while in the body this includes the aorta and its major arterial branches such as carotid, renal, hepatic and mesenteric arteries. MRA is less suitable for providing detailed information about the small, peripheral vasculature.

**POLICY**

Diagnosis alone is not sufficient documentation of medical necessity. The clinical record should provide documentation of medical necessity.

1. CTA or MRA of the head may be considered **medically necessary** for the assessment of:
   a. patients suspected of having steno-occlusive disease of the mid or large size intracranial arteries
   b. patients suspected of having cerebral aneurysm
   c. patients suspected of having intracranial vascular malformation
   d. patients suspected of having cerebral venous sinus compression or thrombosis, or
   e. patients with pulsatile tinnitus

2. CTA or MRA of the neck may be considered **medically necessary** for the assessment of:
   a. patients suspected of having carotid stenosis or occlusion, or
   b. patients suspected of having cervicocranial arterial dissection

3. CTA or MRA of the abdomen / pelvis may be considered **medically necessary** for the assessment of patients with the following clinical indications in whom angiography would otherwise be indicated and in whom a negative CTA or MRA would obviate the need for angiography:
   a. patients suspected of having atherosclerotic renal artery stenosis:
      1) patients with documented hypertension associated with any of the following clinical scenarios
         a) abrupt onset
         b) accelerated progression
         c) onset of hypertension before age 20
         d) refractory to at least 2 conventional medications
2) renal insufficiency that is either unexplained or induced by the angiotension-converting enzyme inhibitors
3) unilateral small kidney
4) renal artery bruits
b. patients with suspected chronic mesenteric ischemia
c. patients with abdominal aortic aneurysm who are to undergo elective repair of the aneurysm
d. patients requiring evaluation of the portal and/or hepatic venous system
e. patients requiring evaluation of the systemic venous system

4. CTA or MRA of the pelvis / lower extremities may be considered medically necessary for the assessment of patients with the following clinical indications:
   a. patients with suspected atherosclerotic disease of the lower extremity in whom angiography would otherwise be indicated and in whom CTA or MRA would obviate the need for angiography
   b. patients with known atherosclerotic disease of the lower extremity who are being evaluated for bypass surgery and in whom angiography fails to identify runoff vessels suitable for bypass

Policy Guidelines

Head
Invasive cerebral angiography has been traditionally considered the reference standard to which the performance of noninvasive diagnostic tests is compared. Both magnetic resonance angiography (MRA) and transcranial Doppler ultrasonography (TCD) have been shown to be effective noninvasive diagnostic tests for evaluating patients suspected of having intracranial arterial steno-occlusive disease and may be used by some physicians as a replacement for invasive cerebral angiography.

In some circumstances, either MRA or TCD alone may provide adequate information to guide appropriate management; however, there are other circumstances whereby it may be necessary to obtain both noninvasive tests before management decisions can be made. For example, the initial noninvasive study may be technically limited by patient motion (particularly a problem for MRA) or by the patient having an inadequate acoustic window (a problem unique to TCD). When this is the case, diagnostic information may be sought using the alternative noninvasive imaging tool. Furthermore, the results of the initial noninvasive evaluation may be borderline or equivocal. Since CDUS and MRA use different physical and technical principles for evaluating the cerebral vasculature, the information obtained from each test can be complementary rather than duplicative in some circumstances.
Neck
Invasive angiography of the cervical carotid arteries has been used traditionally as the definitive preoperative diagnostic evaluation in patients with carotid artery bifurcation stenosis who are being considered for carotid endarterectomy (CEA). However, as recent improvements have been made in noninvasive diagnostic tests to evaluate the carotid bifurcation region, some physicians have favored a preoperative diagnostic approach using noninvasive imaging tests such as carotid duplex ultrasonography (CDUS) and/or MRA to guide management decisions.

CDUS is most commonly used as the initial noninvasive evaluation of the carotid bifurcation as it is less expensive than MRA and generally more readily available than MRA. When the clinical suspicion for steno-occlusive disease is considered along with the results of the initial test (usually CDUS), the physician can decide whether there is sufficient information to determine subsequent management for the patient or whether additional imaging is necessary. One imaging strategy that has emerged and that is supported in the available evidence, uses both CDUS and MRA to evaluate patients prior to CEA. When both noninvasive tests agree as to the necessity of CEA, the surgical management decision is made based on noninvasive imaging alone. However, if there is discordance in the results of MRA and CDUS (e.g., 1 test suggests a severe carotid stenosis but the other test suggests only a mild-to-moderate degree of stenosis), then invasive angiography is performed to determine the management decision. Using this combination strategy, the utilization of invasive angiography for preoperative evaluation for CEA has been reported to decrease substantially.

Abdomen
A variety of abdominal vascular conditions have been proposed for evaluation with contrast-enhanced MRA. Patients who are suspected of having renal artery stenosis may benefit when MRA is used to rule out significant stenosis, thus sparing the patient from invasive angiography. Patients with positive results on MRA may require confirmatory angiography before receiving surgical or intravascular stent treatment for renal artery stenosis. However, confirmation may often be performed during the catheterization for the therapeutic procedure. Similarly, patients with suspected chronic mesenteric ischemia or suspected hepatic arterial disease may benefit from the use of MRA. Potential living renal donors may benefit by using contrast-enhanced MRA for preoperative evaluation of renal anatomy as an alternative to invasive digital subtraction angiography and or computed tomographic angiography (CTA), both of which require ionizing radiation and potentially nephrotoxic iodinated intravenous contrast agents.

Patients who are to undergo elective repair of an abdominal aortic aneurysm undergo preoperative angiographic evaluation to delineate the size and location of the aneurysm as well as its relationship with renal and other branch arteries. MRA has been proposed as a replacement for invasive angiography in this situation. Similarly, patients who are to undergo abdominal organ transplantation may require presurgical angiography and may benefit from the use of MRA. CTA is also proposed as a noninvasive alternative, though
CT uses iodinated contrast agents that pose a higher risk for allergic and nephrotoxic reactions. Patients with suspected abdominal or pelvic venous thrombo-occlusive disease may benefit by using MRA to obviate the need for invasive venography.

**Pelvis**

Pelvic arteriography or venography may be useful in several situations to avoid the need for invasive angiography. Patients with suspected aorto-iliac atherosclerotic disease may benefit by the use of MRA to avoid the need for invasive angiography, and this evaluation often includes arterial evaluation of the lower extremities as well in patients with suspected peripheral vascular disease (e.g., claudication). Other uses of pelvic MRA would include evaluation of renal arteries with ectopic pelvic location of the kidney and evaluation of pelvic veins for thrombo-occlusive disease.

**Lower Extremity**

MRA may be useful for evaluating the arterial and venous structures of the lower extremity. In patients with suspected peripheral vascular disease, MRA may be able to evaluate the extent of disease and guide therapeutic decision making without the need for invasive angiography. Furthermore, MRA may be more sensitive than conventional angiography in identifying distal runoff vessels in potential candidates for peripheral bypass surgery.

**RATIONALE**

CTA or MRA of the pelvis and lower extremities has emerged as an important tool for surgical planning, particularly to identify patent distal run-off vessels when surgical revascularization is considered. (4–7) In addition, MRA has been widely used to evaluate the recurrent symptoms in patients who have undergone either angioplasty or surgical revascularization. A meta-analysis of 34 studies conducted by Koelemay et al. (8) found that MRA was accurate for identifying stenosis (>50%) or occlusions in the aorto-iliac, femoropopliteal, and infrapopliteal regions. Baum et al. (9) found that MRA is more sensitive for identifying runoff vessels compared with conventional angiography. Use of vessels visible only on MRA for bypass surgery provides an opportunity for limb salvage and when compared with bypass to angiographically visible vessels, graft-patency and limb-salvage outcomes are similar. (10) These roles of MRA are recognized by the American College of Radiology Appropriateness Criteria. (11)

Diagnostic performance of MRA of the abdomen for evaluation of renal anatomy in potential living renal donors has improved with the evolution of contrast-enhanced MRA techniques. Recent studies have shown contrast-enhanced MRA to have good sensitivity and specificity for detection of renal arterial and venous anomalies. Three studies reported sensitivity and specificity of 90% or higher for renal arterial anatomy. (12–14) One study examined the ability of contrast-enhanced MRA to detect arterial, venous, ureteral, or parenchymal anomalies during the presurgical evaluation process for laparoscopic nephrectomy. (15) This study found that preoperative MRA agreed
completely with surgical findings in 21 of 28 cases (75%). In this study, the laparoscopic surgical procedure was successful in 27 of 28 cases (96%) and only 1 case required conversion to open nephrectomy, suggesting that some oversights on MRA may not be clinically significant. Furthermore, studies comparing contrast-enhanced MRA to alternatives such as computed tomographic angiography (CTA) and digital subtraction angiography have reported comparable results. (14, 16–18) However, concerns have been raised regarding the ability of MRA or CTA to detect mild or distal-moderate fibromuscular dysplasia (FMD) that can be seen on conventional renal angiography. (19) The prevalence of FMD is about 2% to 6.6% in angiographic case series, and it is unclear what effect donor nephrectomy may have on the subsequent development of hypertension in asymptomatic potential renal donors who have silent FMD. (19)

**CODING**

The following codes for treatment and procedures applicable to this policy are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

**CPT/HCPCS**

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Computed tomographic angiography, abdominal aorta and bilateral iliofemoral lower extremity runoff, with contrast material(s), including noncontrast images, if performed, and image postprocessing

Injection, gadofosveset trisodium, 1 ml

Magnetic resonance angiography with contrast, abdomen
Magnetic resonance angiography without contrast, abdomen
Magnetic resonance angiography without contrast followed by with contrast, abdomen
Magnetic resonance angiography with contrast, lower extremity
Magnetic resonance angiography without contrast, lower extremity
Magnetic resonance angiography without contrast followed by with contrast, lower extremity
Magnetic resonance angiography with contrast, pelvis
Magnetic resonance angiography without contrast, pelvis
Magnetic resonance angiography without contrast followed by with contrast, pelvis

Tinnitus, code range
Subarachnoid hemorrhage
Oclusion and stenosis of precerebral arteria, code range
Oclusion of cerebral arteries, code range
Cerebral artherosclerosis
Cerebral aneurysm, nonruptured
Abdominal aneurysm, ruptered
Abdominal aneurysm without mention of rupture
Aortic aneurysm of unspecified site, ruptured
Thoracoabdominal aneurysm, ruptured
Thoracoabdominal aneurysm without mention of rupture
Aortic aneurysm of unspecified site without mention of rupture
Portal vein thrombosis
Budd-Chiari syndrome
Compression of vein
Vascular insufficiency of intestine
Chronic liver disease and cirrhosis
Anomalies of cerebrovascular system
Other specified anomalies of circulatory system (Aneurysm, congenital, specified site not elsewhere classified)

Tinnitus, right ear
Tinnitus, left ear
Tinnitus, bilateral
Pulsatile tinnitus, right ear
Pulsatile tinnitus, left ear
Pulsatile tinnitus, bilateral
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I63.411  Cerebral infarction due to embolism of right middle cerebral artery
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I63.59  Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery
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I63.8  Other cerebral infarction
I65.01  Occlusion and stenosis of right vertebral artery
I65.02  Occlusion and stenosis of left vertebral artery
I65.03  Occlusion and stenosis of bilateral vertebral arteries
I65.1  Occlusion and stenosis of basilar artery
I65.21 Occlusion and stenosis of right carotid artery
I65.22 Occlusion and stenosis of left carotid artery
I65.23 Occlusion and stenosis of bilateral carotid arteries
I65.8 Occlusion and stenosis of other precerebral arteries
I65.9 Occlusion and stenosis of unspecified precerebral artery
I66.01 Occlusion and stenosis of right middle cerebral artery
I66.02 Occlusion and stenosis of left middle cerebral artery
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I66.11 Occlusion and stenosis of right anterior cerebral artery
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I66.21 Occlusion and stenosis of right posterior cerebral artery
I66.22 Occlusion and stenosis of left posterior cerebral artery
I66.23 Occlusion and stenosis of bilateral posterior cerebral arteries
I66.3 Occlusion and stenosis of cerebellar arteries
I66.8 Occlusion and stenosis of other cerebral arteries
I67.1 Cerebral aneurysm, nonruptured
I67.2 Cerebral atherosclerosis
I71.3 Abdominal aortic aneurysm, ruptured
I71.4 Abdominal aortic aneurysm, without rupture
I71.5 Thoracoabdominal aortic aneurysm, ruptured
I71.6 Thoracoabdominal aortic aneurysm, without rupture
I71.8 Aortic aneurysm of unspecified site, ruptured
I71.9 Aortic aneurysm of unspecified site, without rupture
I79.0 Aneurysm of aorta in diseases classified elsewhere
I81 Portal vein thrombosis
I82.0 Budd-Chiari syndrome
I87.1 Compression of vein
Q27.30 Arteriovenous malformation, site unspecified
Q27.4 Congenital phlebectasia
Q28.0 Arteriovenous malformation of precerebral vessels
Q28.1 Other malformations of precerebral vessels
Q28.2 Arteriovenous malformation of cerebral vessels
Q28.3 Other malformations of cerebral vessels
Q28.8 Other specified congenital malformations of circulatory system

REVISIONS

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| 02-10-2011 | In policy section:  
- To clarify 4. c. added wording of “(refractory to conservative therapy – see Policy Guidelines)” to read “assessment of significant ischemia in the presence of ulcers or gangrene or symptoms of significant claudication (refractory to conservative therapy – see Policy Guidelines).” |
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<td>01-01-2012</td>
<td>- Added Policy Guidelines section</td>
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|           | - In Coding section:  
|           |   - Added CPT Code: 74174                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 02-05-2014| - Policy reviewed.  
|           | - In Coding section:  
|           |   - Added ICD-10 Diagnosis *(Effective October 1, 2014)*                                                                                                                                                                                                                                                                                                                                                                                                                      |
|           | - In Title added "Lower" to read "Computed Tomographic Angiography (CTA) and Magnetic Resonance Angiography (MRA) of the Head, Neck, Abdomen, Pelvis, and Lower Extremities"  
|           | - Description updated  
|           |   - In Policy Section:  
|           |     - In Item 3 a added "atherosclerotic" to read, "patients suspected of having athrosclerotic renal artery stenosis:..."  
|           |     - In Item 3 c removed "or dissection" and added "who are to undergo elective repair of the aneurysm" to read, "patients with abdominal aortic aneurysm who are to undergo elective repair of the aneurysm"  
|           |     - In Item 3 removed medically necessary indications, "patients planning for renal tumor resection" and "surgical planning for kidney donor"  
|           |     - In Item 4 removed medically necessary indications, "assessment of significant ischemia in the presence of ulcers or gangrene or symptoms of significant claudication (refractory to conservative therapy – see Policy Guidelines)", "assessment of disease of large vessels: aneurysm, dissection, A-V malformation, fistulas, or vasculitis" and "arterial entrapment syndrome"  
|           |     - Removed "CTA or MRA of the upper extremities may be considered medically necessary for the assessment of patients with the following clinical indications: a. evaluation of a dialysis graft b. Raynaud's syndrome c. arterial entrapment syndrome d. suspected aneurysm, A-V malformation, fistula, vasculitis or intramural hematoma"  
|           |     - Policy Guidelines updated  
|           | - In Coding Section:  
|           |     - Added HCPCS Codes: A9583, C8920  
|           |     - Removed CPT Codes: 73206, 73225  
|           |     - Removed ICD-10 Codes: I60.00, I60.10, I60.20, I60.30, I60.50, I63.139, I63.239, I65.09  
|           | - References updated  
| 10-01-2016| - In Coding section:  
|           |     - ICD-10 Codes Termined 09-30-2016: I60.21, I60.22
REFERENCES

1. TEC Assessments 1997: Tab 1
2. TEC Assessments 1996: Tab 31
3. TEC Assessments 1996: Tab 32.