Cohere Medical Policy - Magnetic Resonance Angiography (MRA), Chest

Clinical Guidelines for Medical Necessity Review

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Important Notices

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Guideline Information:

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Medical Necessity Criteria

Service: Magnetic Resonance Angiography (MRA), Chest

Recommended Clinical Approach

Magnetic resonance angiography (MRA) of the chest allows for visualizing blood vessels, including the arteries and veins. MRA evaluates vascular diseases, aortic pathologies, congenital heart conditions, venous pathologies, pulmonary artery diseases, and other pathologies (e.g., vasculitis, extrinsic compression). A computed tomography angiogram (CTA) can be performed faster than an MRA and uses different contrast materials. Radiation exposure occurs during a CTA, whereas MRA does not. Magnetic resonance venography (MRV) is a noninvasive technique used to evaluate the central venous system in the chest, and it can help diagnose and stage central venous obstruction. MRA may be appropriate for patients with renal dysfunction, pregnancy, gadolinium-based contrast agent allergy, and children.[1]

Medical Necessity Criteria

Indications

- ➔ **Magnetic resonance angiography (MRA), chest** is considered appropriate if **ANY** of the following is **TRUE** when CTA cannot be performed:
  - ◆ Trauma (e.g., dissection, post-traumatic pseudoaneurysm); **OR**
  - ◆ Vascular conditions, known or suspected, including **ANY** of the following:
    - Abnormality of the thoracic aorta (seen on an ECHO or a chest X-ray)[2]; **OR**
    - Aneurysm (evidence of an aneurysm observed on either an echocardiogram or chest X-ray) or vascular malformation; **OR**
    - Suspicion for acute aortic dissection in the presence of sudden, intense pain in the chest or back[3-4]; **OR**
    - Pulmonary hypertension when CTA is contraindicated or cannot be performed[5]; **OR**
    - Pulmonary embolism when CTA and/or ventilation/perfusion (V/Q) scan cannot be performed[6-13]; **OR**

- Pulmonary vascular abnormality (e.g., pulmonary arteriovenous malformation [PAVM])[14-17]; **OR**
- Superior vena cava (SVC) syndrome[18]; **OR**
- Subclavian steal syndrome following a positive or inconclusive ultrasound[19]; **OR**
- Takayasu's arteritis[20]; **OR**
- Thoracic outlet syndrome[21-26]; **OR**
- Vascular stenosis or occlusion due to atherosclerosis, vasculitis, or thromboembolic phenomena; **OR**
- Vascular supply to, or involvement by, tumor; **OR**
- Venous or arterial anatomy (e.g., congenital abnormalities, extrinsic compression, or causes of intrinsic stenosis or obstruction), including **ANY** of the following:
    - Abnormality of the thoracic aorta[2]; **OR**
    - Congenital heart disease[27-28]; **OR**
    - Marfan syndrome, aortic root, or ascending aorta (follow-up per Marfan's guidelines [3.5 cm to 4.4 cm - annually; 4.5 cm to 5.0 cm or growth rate greater than or equal to 0.5 cm annually - repeat every 6 months; surgery when 5.0 cm or greater]); **OR**
    - Pulmonary arteriovenous malformation (AVM)[14-17]; **OR**
    - Pulmonary arteriovenous fistula (AVF); **OR**
    - Pulmonary vascular abnormality[14-17]; **OR**
    - Venous anatomy (e.g., congenital abnormalities, extrinsic compression, or causes of intrinsic stenosis or obstruction); **OR**
    - Suspected or known thoracic aortic disease (including suspicion of a vascular anomaly causing dysphagia or expiratory wheezing such as a vascular ring)[29-30]; **OR**

◆ Follow-up evaluation of known thoracic aortic aneurysm (TAA) in a patient <u>without</u> syndromic and non-syndromic hereditary thoracic aneurysm disease and **ANY** of the following:

- Annual surveillance for aneurysm less than 5.0 cm; **OR**
- Symptoms suggestive of aneurysmal growth/dissection[31]; **OR**
- 6-month evaluation for aneurysm for **ANY** of the following:
    - Greater than or equal to 5.0 cm; **OR**
    - Growing more than 0.5 cm/year; **OR**

- Follow-up evaluation of known TAA in a patient with syndromic and non-syndromic hereditary thoracic aneurysm disease defined as **ANY** of the following:
  - Vascular Ehlers-Danlos syndrome; **OR**
  - Loeys-Dietz syndrome; **OR**
  - Marfan syndrome; **OR**
  - Coarctation of the aorta; **OR**
  - Tetralogy of Fallot, transposition of the great vessels, truncus arteriosus; **OR**
  - Turner syndrome; **OR**
  - Familial bicuspid aortic valve; **OR**
  - Known predisposition as defined by the presence of genetic markers; **AND**
  - Surveillance MRA at baseline, then follow-up at 6-12 months, then every 6-24 months if stable)[32-33]: **OR**
  - Symptoms suggestive of aneurysmal growth/dissection[31,34]; **OR**
- Ongoing monitoring for possible TAA in patients at high-risk but no prior documented TAA with **ANY** of the following:
  - Loeys-Dietz syndrome monitoring annually if the patient is stable and low risk (less than 0.3 cm aneurysm growth/year) and less than 4.0 cm; **OR**
  - Turner syndrome every 5 to 10 years; **OR**
  - Bicuspid aortic valve every 2 years if TTE/TEE inconclusive; **OR**
  - Marfan syndrome every 2 years; **OR**
- Initial screening MRA for a first-degree relative (parent, sibling, or child) of a patient with thoracic aortic disease with **ANY** of the following:
  - Family history of Marfan syndrome, Loeys-Dietz syndrome, or vascular Ehlers-Danlos; **OR**
  - Family history of TAA due to **ANY** of the following:
    - ACTA2, MYH11, PRKG1, MYLK; **OR**
    - TAA without identified pathogenic variants in a known gene for HTAD; **OR**
    - TAA and bicuspid aortic valve; **OR**
    - Family history of intracranial or peripheral aneurysm; **OR**
    - Turner syndrome; **OR**

        - Coarctation of the aorta; **OR**
        - Congenital heart defects such as tetralogy of Fallot, transposition of the great vessels, truncus arteriosus; **OR**
- Transcatheter aortic valve replacement (TAVR) pre-intervention planning with an assessment of **ANY** of the following[35]:
    - Aortic root; **OR**
    - Supravalvular aorta and vascular access; **OR**
- Pulmonary vein mapping (e.g., prior to atrial fibrillation ablation); **OR**
- Thoracic endovascular repair (TEVAR) for the treatment of thoracic aortic disease and **ANY** of the following is **TRUE**[4,32,36]:
    - Pre-repair; **OR**
    - Post-repair; **OR**
- Post-treatment of acute aortic dissection at **ANY** of the following intervals:
    - 1 month; **OR**
    - 6 months; **OR**
    - Annually; **OR**
- Chronic dissection, annually; **OR**
    - Re-evaluation of known ascending aortic dilation or history of aortic dissection with a change in clinical status (including cardiac exam or other findings that may alter management); **OR**
    - Non-invasive clinical staging of a tumor to define vascular invasion; **OR**
- Congenital or acquired conditions as indicated by **ANY** of the following[37]:
    - Pulmonary sequestration; **OR**
    - Heart disease with **ANY** of the following:
        - Known single ventricle physiology and postoperative evaluation needed after stage 3 single ventricle palliation (total cavopulmonary connection); **OR**
        - Known or suspected anomalous pulmonary venous return; **OR**
        - Repaired tetralogy of Fallot or pulmonary valve stenosis with concern for pulmonary valve dysfunction or branch pulmonary artery stenosis; **OR**
        - Suspected aortic coarctation; **OR**

        - Transposition of the great arteries after arterial switch; **OR**
        - Transposition of the great arteries after atrial switch; **OR**
- Repeat imaging of a specific area or structure using the same imaging modality (in the absence of an existing follow-up guideline) is considered appropriate when **ALL** of the following is **TRUE**:
    - There is documented clinical necessity; **AND**
    - Prior imaging results of the specific area or structure, obtained using the same imaging modality, must be documented and available for comparison; **AND**
    - **ANY** of the following is **TRUE**:
        - A change in clinical status, such as worsening symptoms or the emergence of new symptoms, that may influence the treatment approach; **OR**
        - The requirement for interval reassessment, which may alter the treatment plan; **OR**
        - One-time follow-up of a prior indeterminate finding to assess for interval change; **OR**
        - The need for re-imaging either before or after performing an invasive procedure.

Non-Indications

➔ **Magnetic resonance angiography (MRA), chest** may not be considered appropriate if **ANY** of the following is **TRUE**:

- The patient has undergone advanced imaging of the same body part within 3 months without undergoing treatment or developing new or worsening symptoms; **OR**
- If contrast is used, history of anaphylactic allergic reaction to gadolinium contrast media with detailed guidelines for use in patients with renal insufficiency; **OR**
- The patient has incompatible metallic clips on vascular aneurysms; **OR**
- Incompatible implantable devices (e.g., pacemakers, defibrillators, cardiac valves); **OR**
- Metallic foreign body in orbits/other critical area(s) or within the field of view and obscuring area of concern.

*NOTE: MRI in patients with claustrophobia should be requested at the discretion of the ordering provider.
**NOTE: MRI in pregnant patients should be requested at the discretion of the ordering provider and obstetric care provider.

Level of Care Criteria

Outpatient

Procedure Codes (CPT/HCPCS)

CPT/HCPCS Code	Code Description
71555	Magnetic resonance angiography (MRA), chest (excluding myocardium), with or without contrast material(s)
C8909	Magnetic resonance angiography (MRA) with contrast, chest (excluding myocardium)
C8910	Magnetic resonance angiography (MRA) without contrast, chest (excluding myocardium)
C8911	Magnetic resonance angiography (MRA) without contrast followed by with contrast, chest (excluding myocardium)

Medical Evidence

Londono et al. (2021) performed a retrospective review to evaluate the image quality of the entire thoracic aorta by comparing 3D radial respiratory self-navigated native magnetic resonance angiography (native-SN-MRA) based on a bSSFP sequence with traditional Cartesian 3D contrast-enhanced MRA (CE-MRA) that uses navigator-gated respiration control. Thirty-one aortic native-SN-MRA scans (average age 63.9 years) to 61 CE-MRA scans (average age 63.1 years) were used as a reference. The image quality was evaluated at the aortic root/ascending aorta, aortic arch, and descending aorta. For the 10 patients who underwent both MRA sequences, aortic pathologies were assessed, and both normal and pathological aortic diameters were measured. The study found that native-SN-MRA provides superior image quality for the entire thoracic aorta, especially in areas prone to motion artifacts, while also achieving shorter acquisition times compared to conventional techniques.[38]

Shimohira et al. (2015) present the results of a multicenter study on reperfusion rates of pulmonary arteriovenous malformations (PAVMs) following coil embolization. The study used time-resolved MRA or pulmonary angiography and included patients diagnosed with PAVM who underwent embolization. Sixteen patients in the study cohort underwent coil embolization (24 untreated or reperfused PAVMs). Among these, sac embolization was performed in 12 untreated PAVMs. Primary feeding artery embolization was performed in each of the 12 reperfused PAVMs. Additionally, five PAVMs required 2 to 4 treatments due to reperfusion. The overall study encompassed 32 coil embolizations. Reperfusion rates were examined at 3, 6, 12, and 24 months for both primary embolization (untreated PAVMs) and repeat embolization (reperfused PAVMs). The rates for primary embolization were 8%, 27%, 36%, and 49%, respectively, while for repeat embolization, they were 50%, 50%, 92%, and 100%, respectively. Upon assessment through time-resolved MR angiography or pulmonary angiography, reperfusion rates following coil embolization for pulmonary arteriovenous malformations (PAVMs) were notably elevated, especially in cases of repeat embolization.[17]

Poretti et al. (2015) reviewed using MRA to evaluate thoracic outlet syndrome (TOS). The protocol enables an independent review of veins and arteries by employing a single, simultaneous, and bilateral (SB-MRA) contrast injection, applicable for both abduction and adduction acquisitions. Between 2009 and 2013, 38 MRA studies were conducted for individuals with clinically suspected TOS. The study cohort comprised 13 males and 25 females, with a mean age of 35.9 years (standard deviation equal to 11.13). Out of the total participants,

45% (17 patients) were diagnosed with predominant venous TOS (VTOS), 24% (nine patients) with predominant arterial TOS (ATOS), and 32% (12 patients) exhibited an indeterminate or nonvascular condition. Group A radiologists identified Significantly more VTOS cases than Group B ($p = 0.049$). The interobserver agreement was exceptionally high. The employment of the simultaneous bilateral MRA (SB-MRA) protocol proves to be a secure and dependable method for investigating TOS. The protocol, offering an early acquisition phase allowing separate assessment of veins and arteries, enables the examination of collateral venous flow through a single contrast material injection and enhances diagnostic accuracy, particularly for VTOS. SB-MRA emerges as a valuable tool in diagnosing TOS of vascular origin.[25]

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