National Imaging Associates, Inc.	
Clinical guidelines **CHEST MRA/MRV**	**Original Date: September 1997**
CPT Codes: 71555	**Last Revised Date: April 2023~~: March 2022~~**
Guideline Number: NIA_CG_022-2	**Implementation Date: January 2024~~23~~**

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.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*

INDICATIONS FOR CHEST MRA

Chest Magnetic Resonance Angiography (MRA) is ordered for evaluation of the intrathoracic blood vessels. Chest MRI and Chest MRA should not be approved at the same time.

Vascular Disease

- Superior vena cava (SVC) syndrome[1]
- Subclavian Steal Syndrome after positive or inconclusive ultrasound[2, 3]
- Thoracic Outlet Syndrome[4-6]
- Takayasu's arteritis[7]
- Clinical concern for acute aortic dissection[8, 9]
    - Sudden painful ripping sensation in the chest or back and may include
        - New diastolic murmur
        - Cardiac tamponade
        - Distant heart sounds
        - Hypotension or shock

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- For MRPA (MR Pulmonary Angiography) in patients with intermediate pretest probability with a positive D-dimer or high pretest probability (but only at centers that routinely perform it well and only for patients for whom standard tests are contraindicated)
    - Risk can be determined by the parameters detailed in Background section

Initial/Screening for Thoracic Aortic Disease[10-12]

- Echocardiogram or chest x-ray show aneurysm
- Screening of first-degree relatives of individuals with a thoracic aortic aneurysm (defined as ≥ 50% above normal) or dissection
- Evaluation in patients with known or suspected connective tissue disease or genetic condition that predisposes to aortic aneurysm or dissection, such as Marfan's, Ehlers-Danlos, get a one-time study or for Loeys-Dietz syndrome- allow imaging at diagnosis and then every two years, or more frequently if abnormalities are found (Imaging may include head, neck, chest, abdomen and pelvis)~~14, 20~~ (MRA preferred due to cumulative radiation risk)

~~such as Marfan's, Ehlers's~~
~~Danlos or Loeys-Dietz syndrome (at the time of diagnosis and 6 months thereafter),~~
~~followed by annual imaging (can be done more frequently if > 4.5 cm or rate of growth > 0.5 cm/year up to twice per year)~~

- Screening of the thoracic aorta after a diagnosis of a bicuspid aortic valve (dilation of the ascending aorta may not be seen on echocardiogram)[13, 14]
    - If normal, reimage every three to five years
- Screening of first-degree relatives of patients with a bicuspid aortic valve
- Turner's syndrome – Screen for coarctation or aneurysm of the thoracic aorta
    - If normal results, screen every 5-10 years
    - If abnormal, screen annually
- Suspected vascular cause of dysphagia or expiratory wheezing with other imaging is suggestive or inconclusive

Follow-up after established Thoracic Aneurysm[14-16]

- Six months follow-up after initial finding of a dilated thoracic aorta, for assessment of rate of change
    - Aortic Root or Ascending Aorta (in cm)
        - 3.5 to 4.4 – annual
        - 4.5 to 5.5 or growth rate ≥ 0.5cm/year – every 6 months
    - Genetically mediated (Marfan syndrome, Aortic Root or Ascending Aorta) (in cm)
        - 3.5 to 4.4 – annual
        - 4.5 to 5.5 or growth rate ≥ 0.5cm/year – every 6 months
        - Surgery generally recommended over 5.0cm
    - Descending Aorta (in cm)[17]

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        - 4.0 to 5.0 – annual
        - 5.0 to 6.0 – every 6 months
- Follow-up post medical treatment of aortic dissection:
    - Acute dissection: 1 month, 6 months, then annually
    - Chronic dissection: annually
- Follow-up TEVAR surveillance at 1 month, then 1 year post op if stable, then annually
- Follow-up open repair if no residual aortopathy within first post op year, then every 5 years (if have residual aortopathy or abnormal findings on surveillance, annual follow-up if needed)
- Re-evaluation of known ascending aortic dilation or history of aortic dissection with a change in clinical status or cardiac exam or when findings may alter management

Congenital Malformations

- Thoracic malformation on other imaging (chest x-ray, echocardiogram, gastrointestinal study, or inconclusive CT)[15-18]
- Congenital heart disease with pulmonary hypertension[19] or vascular anomalies
- Pulmonary Sequestration[20]

Pulmonary Hypertension based on other testing[21, 22]

- Echocardiogram
- Right heart catheterization

Atrial fibrillation with ablation planned[23]

Pre-operative/procedural evaluation

- Pre-operative evaluation for a planned surgery or procedure
- Pre-transplant CT or CTA/MRA chest approvable for surgical planning (to evaluate for vascular anatomy, mediastinal pathology, malignancy screening etc.)

Post-operative/procedural evaluation

- Post-operative complications[24, 25]
- See above indications for TAA follow up

Chest MRA and Abdomen MRA or Abdomen/Pelvis MRA

- -Transcatheter Aortic Valve Replacement (TAVR)
- Acute aortic dissection

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- ~~Takayasu's arteritis~~

-
- Post-operative complications
- To evaluate for an embolic source of lower extremity vascular disease (may also approved as a combination chest MRA, Abdominal MRA and a single LE MRA when LE runoff disease needs to be evaluated as well). Echocardiography is also needed, since the heart is the most commonly reported source of lower extremity emboli i, accounting for 55 to 87 percent of events.

Other Indications

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

~~*a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*~~

BACKGROUND

Magnetic resonance angiography (MRA) is a noninvasive technique used to provide cross-sectional and projection images of the thoracic vasculature, including large- and medium-sized vessels, e.g., the thoracic aorta. MRA provides images of both normal and diseased blood vessels, and it quantifies blood flow through these vessels. Successful vascular depiction relies on the proper imaging pulse sequences. MRA may use a contrast agent, gadolinium, which is non-iodine-based, for better visualization. It can be used in patients who have history of contrast allergy and who are at high risk of kidney failure.

OVERVIEW

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Coarctation of the Aorta – One of the most common congenital vascular anomalies is coarctation of the aorta, characterized by obstruction of the juxtaductal aorta. Clinical symptoms, e.g., murmur, systemic hypertension, difference in blood pressure in upper and lower extremities, absent femoral or pedal pulses, may be present. Gadolinium-enhanced 3D MRA may assist in preoperative planning as it provides angiographic viewing of the aorta, the arch vessels, and collateral vessels. It may also assist in the identification of postoperative complications.

Pulmonary Embolism (PE) –Studies show mixed results regarding the value of MRA versus CTA in detecting pulmonary embolism. A systematic review and meta-analysis found MRA to be inferior to CTA in detecting PE. Therefore, MRA should be used only if CTA is not available or contraindicated in a specific patient.[26]

Central Venous Thrombosis – CTA/MRA is useful in the identification of venous thrombi. Venous thrombosis can be evaluated by gadolinium-enhanced 3D MRA as an alternative to CTA, which may not be clinically feasible due to allergy to iodine contrast media or renal insufficiency.

MRI and Patent Ductus Arteriosus – Patent ductus arteriosus (PDA) is a congenital heart problem in which the ductus arteriosus does not close after birth. It remains patent allowing oxygen-rich blood from the aorta to mix with oxygen-poor blood from the pulmonary artery. MRI can depict the precise anatomy of a PDA to aid in clinical decisions. It allows imaging in multiple planes without a need for contrast administration. Patients are not exposed to ionizing radiation.

Other MRA Indications – MRA is useful in the assessment for postoperative complications of pulmonary venous stenosis.

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POLICY HISTORY

Date	Summary
2024	• Simplified PE indications and removed other details from background) • Clarified and updated follow up after repair of TAA
March 2022	• No significant changes
April 2021	• Follow-up recommendations for bicuspid aortic valve • Added suspected vascular cause of dysphagia or expiratory wheezing • Combined follow-up surveillance recommendations for endovascular and open ascending aorta repair as per literature review • Added indications for combination studies and for ordering combination studies • Added Pulmonary Embolism criteria to Overview • Clarified pre-operative evaluation for a planned surgery or procedure
May 2020	• Thoracic Aortic Disease ○ Organized into two sections: ▪ Initial/Screening ▪ Follow-up of known aneurysm/vascular pathology • Removed: 'Annual follow-up of enlarged thoracic aorta that is above top normal for age, gender, and body surface area'
May 2019	• Removed pulmonary embolism indication • Added indications specifying criteria for follow-up of thoracic aneurysm • Added statement: "For MRPA (MR Pulmonary Angiography) in patients with intermediate pretest probability with a positive D-dimer or high pretest probability (but only at centers that routinely perform it well and only for patients for whom standard tests are contraindicated)" • Expanded criteria for congenital malformations • Updated thoracic aortic disease section for consistency with cardiac guidelines • Added greater specificity for post op complications

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POLICY HISTORY

Date	Summary
April 2023	• Simplified PE indications and removed other details from background) • Clarified and updated follow up after repair of TAA • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging
March 2022	• No significant changes

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