National Imaging Associates, Inc.	
Clinical guidelines **ABDOMEN MRA/MRV (Angiography)**	**Original Date: September 1997**
CPT Codes: 74185	**Last Revised Date: ~~April 2022~~ March 2023**
Guideline Number: NIA_CG_034-2	**Implementation Date: January 202~~423~~**

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.*

IMPORTANT NOTE:

Abdomen/Pelvis Magnetic Resonance Angiography (MRA) with~~&~~ Lower Extremity MRA Runoff Requests: Two authorization requests are required, one Abdomen MRA, CPT code 74185 and one for Lower Extremity MRA, CPT code 73725 (a separate Pelvic MRA request is not required). This will provide imaging of the abdomen, pelvis, and both legs.

INDICATIONS FOR ABDOMEN MR ANGIOGRAPHY/MR VENOGRAPHY (MRA/MRV)

Arterial Disease

For evaluation of known or suspected abdominal vascular disease
Abdominal Aortic Aneurysm (AAA) (also approve MRA Pelvis):

- For **asymptomatic** known or suspected~~, **asymptomatic**~~ abdominal aortic aneurysms, **ultrasound** should be done prior to advanced imaging. Only when the ultrasound is inconclusive, is advanced imaging with CT or MRI needed~~.~~

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- For **symptomatic** known or suspected AAA (such as recent-onset abdominal pain or back pain, particularly in the presence of a pulsatile or epigastric mass, suspected dissection or significant risk factors for AAA) CTA/MRA is appropriate and generally preferred over CT/MRI. (If contrast is contraindicated or other clinical indications for abdomen and/or pelvic imaging are present, then CT/MR may be approved rather than CTA/MRA).
- If there is known complex anatomy, CTA/MRA may be needed.

- Evaluation of known or suspected aortic aneurysm‡ (also approve MRA pelvis)[1-3]:
  - For screening, US is initial study
    - Known or suspected aneurysm > 2.5 cm AND equivocal or indeterminate ultrasound results
    - Prior imaging (e.g., ultrasound) demonstrating aneurysm >2.5 cm in diameter
    - Suspected complications of known aneurysm as evidenced by signs/symptoms, such as new onset of abdominal or pelvic pain
    - Surveillance imaging every three years for diameter 2.0-2.9 cm and annually for 3.0-3.4 cm if doppler ultrasound is inconclusive. If > 3.5 cm, < 6 month follow-up (and consider intervention)[4]

‡NOTE:

Other vascular abnormalities seen on prior imaging studies:

- Initial evaluation of inconclusive vascular findings on prior imaging
- Follow-up of known visceral vascular conditions (such as aneurysm, dissection, compression syndromes, arteriovenous malformations (AVMs), fistulas, intramural hematoma, and vasculitis) (pelvis may also be approved if needed based on location of abnormality)
  - Hepatic vascular abnormalities after ultrasound has been performed to clarify or further evaluate findings
- For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography (also approve CTA pelvis)[1]
- Vascular invasion or displacement by tumor (conventional CT or MRI also appropriate)[2]
- For known large vessel diseases (inferior vena cava, superior/inferior mesenteric, celiac, splenic or renal arteries/veins), e.g., aneurysm/dissection (non-aortic disease), arteriovenous malformations (AVMs), and fistulas, intramural hematoma, and vasculitis[3-5]
  - Surveillance may be done with ultrasound at intervals similar to AAA, however, CTA/MRA rather than CT/MRI may be needed for non-aortic disease when ultrasound is inconclusive[6]

Evidence of vascular abnormality seen on prior imaging studies and limited to the abdomen
For known large vessel diseases (abdominal aorta, inferior vena cava, superior/inferior mesenteric, celiac, splenic, renal or iliac arteries/veins), e.g., aneurysm, dissection, compression syndromes, arteriovenous malformations (AVMs), fistulas, intramural hematoma, and vasculitis limited to the abdomen
For suspected aortic dissection (approve CTA/MRA abdomen and pelvis)
For diagnosis or follow-up of visceral artery aneurysm[5,6] **Vascular ischemia or hemorrhage**:

- To determine the vascular source of retroperitoneal hematoma or hemorrhage ~~in the setting of trauma, tumor invasion, fistula or vasculitis when~~when CT is insufficient to determine the source and CTA is contraindicated (CT rather than MRA/CTA is the modality of choice for diagnosing hemorrhage)[5]
- For evaluation of known or suspected mesenteric ischemia/ischemic colitis when CTA is contraindicated (can approve MRA abdomen and pelvis)[7]

For patients at increased risk for vascular abnormalities (CTA or MRA):

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study of the abdomen and pelvis ~~(CTA or MRA)~~[8]
- For patients with vascular Ehlers-Danlos syndrome or Marfan syndrome, ~~recommend~~ a one-time study of the abdomen and pelvis ~~(CTA/MRA)~~
- For Loeys-Dietz, imaging at diagnosis and then ~~least~~ every two years, more frequently if abnormalities are found (Imaging may include head, neck, chest, abdomen and pelvis)[9, 10]
- ~~For assessment in patients with spontaneous coronary artery dissection (SCAD), can be done at time of coronary angiography (also approve CTA pelvis)~~[11]
- ~~Vascular invasion or displacement by tumor (conventional CT or MRI also appropriate)~~[12]
- ~~For evaluation of hepatic blood vessel abnormalities (aneurysm, hepatic vein thrombosis, stenosis post-transplant) after doppler ultrasound has been performed; to clarify or further evaluate ultrasound findings~~

For evaluation of known or suspected renal artery stenosis or resistant hypertension in the setting of normal renal function (with impaired renal function, eGFR <30, use US with Doppler) unrelated to recent medication[11] demonstrated by any of the following[12, 13]:

- Unsuccessful control after treatment with 3 or more (>2) anti-hypertensive medication at optimal dosing
- Acute elevation of creatinine after initiation of an angiotensin converting enzyme inhibitor (ACE inhibitor) or angiotensin receptor blocker (ARB)
- Asymmetric kidney size noted on ultrasound
- Onset of hypertension in a person younger than age 30 without any other risk factors or family history of hypertension
- Significant hypertension (diastolic blood pressure > 110 mm Hg) in a young adult (i.e., younger than 35 years) suggestive of fibromuscular dysplasia
- Diagnosis of a syndrome with a higher risk of vascular disease, such as neurofibromatosis, tuberous sclerosis, and Williams' syndrome
- New onset of hypertension after age 50
- Acute rise in blood pressure in a person with previously stable blood pressures
- Flash pulmonary edema without identifiable causes
- Malignant hypertension
- Bruit heard over renal artery and hypertension

- Abnormal/inconclusive renal doppler ultrasound

Venous Disease

- Suspected renal vein thrombosis in patient with known renal mass or from other causes[14]
- Venous thrombosis if previous studies have not resulted in a clear diagnosis (add pelvis MRA/MRV when appropriate)
- For known/suspected May-Thurner syndrome (iliac vein compression syndrome include pelvic ~~C~~MR~~T~~V)[4, 15]
- Vascular invasion or displacement by tumor (conventional CT or MRI also appropriate)[2]
- For evaluation of portal venous system (hepatic portal system) after doppler ultrasound has been performed
- For evaluation of suspected pelvic vascular disease or pelvic congestive syndrome (ordered in addition to Pelvis MRA) when findings on ultrasound are indeterminate (MR or CT venography may be used as the initial study for evaluating pelvic thrombosis or thrombophlebitis)
- For ~~diffuse~~ unexplained lower extremity edema (typically unilateral or asymmetric) with negative or inconclusive ultrasound[16]
- In pregnant women with suspected deep venous thrombosis (DVT) (vs serial compression ultrasound) (include pelvis MRV for iliac veins)[17]

Pre-operative evaluation

- For evaluation of transjugular intrahepatic portosystemic shunt (TIPS) when Doppler ultrasound indicates suspected complications
- Evaluation prior to interventional vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation prior to endovascular aneurysm repair (EVAR)
- Imaging of the deep inferior epigastric arteries for surgical planning (breast reconstruction surgery), include pelvic MRA [18]
- Prior to solid organ transplantation when vascular anatomy is needed
- ~~For pre-transplant evaluation of either liver or kidney~~
- For surgical planning for UPJ (ureteropelvic junction) obstruction to look for a lower pole crossing vessel
- Planning prior Y90 radiation treatment for liver cancer in order to evaluate anatomic variation/shunts/determine best catheter placement/see if coil(s) needed[19]

Post-operative or post-procedural evaluation

- Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested

- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms, related to surgical bypass grafts, vascular stents, and stent-grafts in the peritoneal cavity
- Follow-up for post-endovascular repair (EVAR) or open repair of abdominal aortic aneurysm (AAA)[20] or abdominal extent of iliac artery aneurysms (CT preferred unless MRA/CTA is needed for procedural planning or to evaluate complex anatomy)
    - Routine, baseline study (post-op/intervention) is warranted within the first month~~1-3 months~~ after EVAR:
        - Repeat in 6 months if type II endoleak is seen (continue every 6 months x 24 months, then annually)
        - Repeat in 12 months if no endoleak or sac enlargement is seen
        - If neither endoleak nor AAA enlargement is seen on imaging one year after EVAR, CT is needed only if US is not feasible for annual surveillance (until year 5 as below)

      ~~(abdomen and pelvis MRA when CTA is inconclusive or cannot be performed)~~[1,23]
    - ~~If asymptomatic at six (6) month intervals for one (1) year, then annually~~Non-contrast CT of entire aorta (Abdomen and Pelvis) is needed every 5 years after open repair of AAA or EVAR
    - If symptomatic~~/complications~~ or imaging shows ~~increasing~~increasing, or new findings related to stent graft – more frequent imaging may be needed
    - For suspected complication such as: new-onset lower extremity claudication, ischemia, or reduction in ABI after aneurysm repair.

~~Follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.~~

Other Vascular indications

- For evaluation of hepatic blood vessel abnormalities (aneurysm, hepatic vein thrombosis, stenosis post-transplant) after doppler ultrasound has been performed; to clarify or further evaluate ultrasound findings
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- Kidney failure or renal insufficiency if initial evaluation performed with ultrasound is inconclusive to evaluate for renal artery stenosis

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)

Chest MRA/Abdomen MRA/Pelvic MRA combo

- For evaluation of extensive vascular disease involving the chest and abdominal cavities
- For pre-op or preprocedural evaluation for Transcatheter Aortic Valve Replacement (TAVR)[21, 22]
- Acute aortic dissection (CTA or CT preferred)[23]
- Takayasu's arteritis[24]
- Marfan syndrome
- Loeys-Dietz
- Spontaneous coronary artery dissection (SCAD)
- Vascular Ehlers-Danlos syndrome
- Post-operative complications
- Significant post-traumatic or post-procedural vascular complications reasonably expected to involve the chest and/or abdomen and/or pelvis

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BACKGROUND

Magnetic resonance angiography (MRA) generates images of the arteries that can be evaluated for evidence of stenosis, occlusion, or aneurysms. It is used to evaluate the arteries of the abdominal aorta and the renal arteries. Contrast-enhanced MRA requires the injection of a contrast agent, resulting in very ~~high-quality~~high-quality images. MRA does not use ionizing radiation, allowing MRA to be used for follow-up evaluations. Abdominal MRA is not used as a screening tool, e.g., evaluation of asymptomatic patients without a previous diagnosis.

OVERVIEW

MRI Follow-up for post-endovascular repair (EVAR) – Although studies have shown that MRA is as sensitive as CT in detecting endoleaks, CTA is generally the study of choice in this evaluation due to convenience, improved spatial resolution, and less artifact from components of the stent graft. MRA is most helpful in the postoperative evaluation of patients with impaired renal function, but not severe enough to have contraindication to gadolinium administration or when CTA is inconclusive.
MRA and Abdominal Aortic Aneurysm – Endovascular repair is an alternative to open surgical repair of an abdominal aortic aneurysm. It has lower morbidity and mortality rates and is minimally invasive. In order to be successful, it depends on precise measurement of the aneurysm and involved vessels. MRA with gadolinium allows visualization of the aorta and major branches and is effective and reliable for use in planning the placement of the endovascular aortic stent graft. MRA is also used for the detection of postoperative complications of endovascular repair.

Abdominal Aneurysms and general guidelines for follow-up – The normal diameter of the suprarenal abdominal aorta is 3.0 cm and that of the infrarenal is 2.0 cm. Aneurysmal dilatation of the infrarenal aorta is defined as diameter ≥ 3.0 cm or dilatation of the aorta ≥ 1.5x the normal diameter.[25] Evaluation of AAA can be accurately made by ultrasound. Ultrasound can detect and size AAA, with the advantage of being relatively inexpensive, noninvasive, and not requiring iodinated contrast. The limitations are that overlying bowel gas can obscure findings and the technique is ~~operator-dependent~~operator dependent. Ultrasound is used to screen for and to monitor aneurysms*. CT is used when US is inconclusive or insufficient. When there are suspected complications, complex anatomy and/or surgery is planned, CTA/MRA is preferred. ~~CTA/MRA are needed only when ultrasound is insufficient or when surgery is planned.~~ Risk factors for AAA ~~include:~~include smoking history, age, male gender, family history of AAA (first degree relative) and personal history of vascular disease. Risk factors for rupture include female gender, large initial aneurysm diameter, low FEV, current smoking history, elevated mean blood pressure and patients on immunosuppression after major organ transplantation. The Society of Vascular Surgery recommends elective repair of AAA ≥ 5.5 cm in patients at low or acceptable surgical risk.[20]

Ultrasound screening intervals*:

- Aneurysm size 2.5–3 cm, every 10 years
- Aneurysm size 3.0–3.9 cm, every 3 years
- Aneurysm size 4.0-4.9 cm, annually[26]
- Aneurysm size 5.0-5.4 cm, every 6 months

~~Recommended intervals for initial follow-up imaging of ectatic aortas and abdominal aortas (follow-up intervals may vary depending on comorbidities and the growth rate of the aneurysm) from the white paper of the ACR Incidental Findings Committee II on vascular findings[2]:~~
~~2.5-2.9 cm:.....5 yr~~
~~3.0-3.4 cm:.....3 yr~~
~~3.5-3.9 cm:.....2 yr~~
~~4.0-4.4 cm:.....1 yr~~
~~4.5-4.9 cm:.....6 mo~~
~~5.0-5.5 cm:.....3-6 mo~~

~~The Society of Vascular Surgery has different follow-up intervals for AAA[1]:~~
~~>2.5 cm - <3 cm.....10 yr~~
~~3.0 - 3.9 cm.....3 yr~~
~~4.0 - 4.9 cm.....12 mo~~
~~5.0 - 5.4 cm.....6 mo.~~

~~The Society of Vascular Surgery recommends elective repair of AAA ≥ 5.5 cm in patients at low or acceptable surgical risk.[1]~~**MRA and Chronic Mesenteric Ischemia** -"MRA has become increasingly accurate in depicting and grading stenosis of the mesenteric vessels, particularly for the celiac artery

and SMA, with reported sensitivity and specificity in suspected chronic mesenteric ischemia up to 95% to 100%" and may be used for measuring flow in the SMA and superior mesenteric veins.[7]

MRA and Renal Artery Stenosis – Renal artery stenosis is the major cause of secondary hypertension. It may also cause renal insufficiency and end-stage renal disease. Atherosclerosis is one of the common causes of this condition, especially in older patients with multiple cardiovascular risk factors and worsening hypertension or deterioration of renal function. Navigator-gated MR angiography is used to evaluate the renal arteries and detect renal artery stenosis.

MRA and Renal Vein Thrombosis – Renal vein thrombosis is a common complication of nephrotic syndrome and often occurs with membranous glomerulonephritis. Gadolinium-enhanced MRA can demonstrate both the venous and arterial anatomy and find filling defects within renal veins. The test can be used for follow-up purposes as it does not use ionizing radiation.

MRI/CT and acute hemorrhage – MRI is not indicated and MRA/MRV (MR Angiography/Venography) is rarely indicated for evaluation of intraperitoneal or retroperitoneal hemorrhage, particularly in the acute setting. **CT is usually the study of choice** due to its availability, speed of the study, and less susceptibility to artifact from patient motion. Advances in technology have allowed conventional CT to not just detect hematomas but also the source of acute vascular extravasation. In special cases, finer vascular detail to assess the specific source vessel responsible for hemorrhage may require the use of CTA. CTA in diagnosis of lower gastrointestinal bleeding is such an example.[27]

MRA/MRV is often utilized in non-acute situations to assess vascular structure involved in atherosclerotic disease and its complications, vasculitis, venous thrombosis, vascular congestion, or tumor invasion. Although some of these conditions may be associated with hemorrhage, it is usually not the primary reason why MRI/MRA/MRV is selected for the evaluation. A special condition where MRI may be superior to CT for evaluating hemorrhage is to detect an underlying neoplasm as the cause of bleeding.[5]

~~**POLICY HISTORY**~~

~~**Date**~~	~~**Summary**~~
~~2023~~	~~—~~
~~April 2022~~	~~• Added indication for UPJ surgery~~ ~~• Added "(abdomen and pelvis MRA when CTA is inconclusive or cannot be performed)" to follow up for EVAR and AAA~~ ~~• Added Y90 indication~~
~~April 2021~~	~~• No substantive changes~~
~~May 2020~~	~~• Added compression syndromes for evaluation of vascular disease~~ ~~• Added evaluation of FMD, Vascular Ehlers-Danlos syndrome, Loetz-Dietz~~ ~~• Added May-Thurner~~ ~~• Added to assess DVT in pregnant women vs serial compression ultrasound, to include pelvis~~

	• ~~Added indications for combo studies for chest MRA/abdomen and pelvis MRA~~
~~May 2019~~	• ~~Added indications for visceral artery aneurysm; suspected chronic mesenteric ischemia; transjugular intrahepatic portosystemic shunt when US indicates suspected complications; imaging of deep inferior epigastric arteries for surgical planning (breast reconstruction surgery)~~ • ~~Added Background information and updated references~~

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ADDITIONAL RESOURCES

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Reviewed / Approved by NIA Clinical Guideline Committee

POLICY HISTORY

Date	Summary
March 2023	• Aneurysm: specified guidance on initial imaging and screening intervals with emphasis on requiring ultrasound on initial imaging and indications for advanced imaging, specified guidance on post-repair imaging • Other vascular abnormalities: clarified indication for non-aortic vascular conditions • Transplant: added section • 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 • Aligned sections across body imaging guidelines
April 2022	• Added indication for UPJ surgery • Added "(abdomen and pelvis MRA when CTA is inconclusive or cannot be performed)" to follow-up for EVAR and AAA • Added Y90 indication

Reviewed / Approved by NIA Clinical Guideline Committee

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