

<b>National Imaging Associates, Inc.*</b>	
<b>Clinical guidelines</b> <b>UPPER EXTREMITY MRA/MRV</b>	<b>Original Date: July 2008</b>
<b>CPT Codes: 73225</b>	<b>Last Revised Date: May 2021</b>
<b>Guideline Number: NIA_CG_058-2</b>	<b>Implementation Date: January 2022</b>

When a separate MRA and MRI exam is requested, documentation requires a medical reason that clearly indicates why additional MRI imaging of the upper extremity is needed.

## INDICATIONS FOR UPPER EXTREMITY MRA/MRV

### Hand Ischemia

(Bae, 2015; Hotchkiss, 2014; Wong, 2016)

- Arterial Doppler not needed with any of these acute symptoms:
  - Ischemic ulceration without segmental temperature change-
  - Ischemic ulceration with painful ischemia-
  - Acute sustained loss of perfusion with or without acral ulceration-
  - Imminent loss of digit-
- Clinical symptoms without the above features, arterial Doppler abnormal and will change management
  - Includes Raynaud's (can be associated with scleroderma), Buerger disease, and other vasculopathies (McMahan, 2010)
- Clinical concern for vascular cause of ulcers with abnormal or indeterminate ultrasound (Rosyd, 2017)
- After stenting or surgery with signs of recurrence or indeterminate ultrasound (Pollak, 2012)

### Deep Venous Thrombosis or Embolism

(Dill, 2014; Heil, 2017)

- After abnormal ultrasound of arm veins if it will change management, or negative or indeterminate ultrasound to rule out other causes
- For evaluation of central veins
- Clinical suspicion of upper arterial emboli (Bozlar, 2013a, 2013b4)

**Clinical suspicion of vascular disease** with abnormal or indeterminate ultrasound or other imaging (Bozlar, 2013a, 2013b)

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- Tumor invasion (Jin, 2018; Kransdorf, 2018)
- Trauma (Wani, 2012)
- Vasculitis (Fonseca, 2017; Hotchkiss, 2014)
- Aneurysm (Verikokos, 2014)
- Stenosis/occlusions (Menke, 2010)

### **Vascular Malformation**

(Madani, 2015; Obara, 2019)

- Non-diagnostic doppler ultrasound

[Traumatic injuries with clinical findings suggestive of arterial injury – CTA preferred emergently \(Wani, 2012\)](#)

[Assessment/evaluation of known vascular disease/condition](#)

### **Pre-operative/procedural evaluation**

- Pre-operative evaluation for a planned surgery or procedure (Ahmed, 2017)-

### **Post-operative/procedural evaluations**

- A 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.

### **Special Circumstances**

(Weiss, 2017)

- High suspicion of an acute arterial obstruction - Arteriography preferred (the gold standard)-
- Renal impairment
  - Not on dialysis
    - Mild to moderate, GFR 30-89 ml/min MRA can be done
    - Severe, GFR < 30 ml/min MRA without contrast
  - On dialysis
    - CTA with contrast can be done
- Doppler ultrasound can be useful in evaluating bypass grafts

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## **BACKGROUND**

Magnetic resonance angiography (MRA) is a noninvasive alternative to catheter angiography for evaluation of vascular structures in the upper extremity. Magnetic resonance venography (MRV) is used to image veins instead of arteries. MRA and MRV are less invasive than conventional x-ray digital subtraction angiography.

## OVERVIEW

**UPPER EXTREMITY DVT** — “Secondary DVT of the upper extremity is by far the most common type. Indwelling venous devices such as catheters, pacemakers, and defibrillators put patients at the highest risk of thrombus. Central venous catheters, which are difficult to place, such as those requiring multiple insertion attempts, are noted to have increased incidence of associated thrombus [9]. Other risk factors associated with higher likelihood of UEDVT include advanced age, previous thrombophlebitis, postoperative state, hypercoagulability, heart failure, cancer, right-heart procedures, and intensive care unit admissions” (ACR Dill, 2014).

**MRA/MRV and Raynaud’s Syndrome** – Raynaud’s syndrome is evidenced by episodic waxy pallor or cyanosis of the fingers caused by vasoconstriction of small arteries or arterioles in the fingers. It usually occurs due to a response to cold or to emotional stimuli. MRA may be used in the evaluation of Raynaud’s syndrome.

**MRA/MRV and Stenosis or Occlusion** – MRA of the central veins of the chest is used for the detection of central venous stenoses and occlusions. High-spatial resolution MRA characterizes the general morphology and degree of stenosis. Enlarged and well-developed collateral veins in combination with the non-visualization of a central vein may be indicative of chronic occlusion, whereas less-developed or absent collateral veins are suggestive of acute occlusions. A hemodynamically significant stenosis may be indicated by the presence of luminal narrowing with local collaterals (Conte, 2019; Kim, 2008).

**MRA and arterial obstructive disease** – Catheter angiography is the standard of reference for assessing arterial disease but MRA with contrast-enhanced media has gained acceptance and can image the entire vascular system. Contrast agents such as high dose gadolinium have been associated with the development of nephrogenic systemic fibrosis in patients with chronic renal insufficiency, but newer agents are safer in this regard. Gadolinium dosage may be decreased without compromising image quality in high-spatial-resolution contrast-enhanced MRA of the upper extremity.

## POLICY HISTORY

Date	Summary
May 2021	<u>Reviewed literature for updates</u> No changes
<u>May 2020</u>	<ul style="list-style-type: none"><li>• <u>Clarified that MRA does not include a baseline MR exam</u></li><li>• <u>Expanded section about vascular malformation to include initial testing.</u></li><li>• <u>Added information about renal function and contrast agents</u></li><li>• <u>Simplified language</u></li><li>• <u>Updated references</u></li></ul>

May 2019

- Reformatted/modified indications to include hand ischemia; deep venous thrombosis or embolism and clinical suspicion of vascular disease
- Updated background information and references

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## REFERENCES

- Ahmed O, Hanley M, Bennett SJ, et al. American College of Radiology ACR Appropriateness Criteria® - Vascular Claudication: Assessment for Revascularization. *J Am Coll Radiol*. May 2017; 14(5 Suppl):S372-379. <https://acsearch.acr.org/docs/69411/Narrative/>. Published 2017.
- Bae M, Chung SW, Lee CW, et al. Upper limb ischemia: Clinical experiences of acute and chronic upper limb ischemia in a single Center. *Korean J Thorac Cardiovasc Surg*. 2015; 48(4):246–251. doi:10.5090/kjtcs.2015.48.4.246.
- Bozlar U, Ogur T, Norton P, et al. CT angiography of the upper extremity arterial system: Part 1-anatomy, technique, and use in trauma patients. *AJR Am J Roentgenol*. 2013a; 201(4):745-752
- Bozlar U, Ogur T, Norton P, et al. CT angiography of the upper extremity arterial system: Part 2-clinical applications beyond trauma patients. *AJR Am J Roentgenol*. 2013b; 201(4):753-763.
- Conte MS, Bradbury AW, Kolh P, et al. Global vascular guidelines on the management of chronic limb-threatening ischemia. *J Vasc Surg*. 2019 Jun; 69(6S):3S-1255.e40. Epub 2019 May 28.
- Dill KE, Bennett SJ, Hanley M, et al. American College of Radiology ACR Appropriateness Criteria® - Upper Extremity Swelling. <https://acsearch.acr.org/docs/69417/Narrative/>. Published 2014.
- Fonseka CL, Galappaththi SR, Abeyaratne D, et al. A case of polyarteritis nodosa presenting as rapidly progressing intermittent claudication of right leg. *Case Reports in Medicine*. 2017; 017, Article ID 4219718.
- Heil J, Miesbach W, Vogl T, et al. Deep vein thrombosis of the upper extremity. *Dtsch Arztebl Int*. 2017; 114(14):244–249.
- Hotchkiss R, Marks T. Management of acute and chronic vascular conditions of the hand. *Curr Rev Musculoskelet Med*. 2014; 7(1):47–52.
- Jin T, Wu G, Li X, et. al. Evaluation of vascular invasion in patients with musculoskeletal tumors of lower extremities: Use of time-resolved 3D MR angiography at 3-T. *Acta Radiol*. 2018 May; 59(5):586-592.
- [Kim CY, Merkle EM. Time-resolved MR angiography of the central veins of the chest. \*AJR Am J Roentgenol\*. 2008;191\(5\):1581-1588. doi:10.2214/AJR.08.1027.](#)**
- Kransdorf MJ, Murphey MD, Wessell DE, et al. American College of Radiology ACR Appropriateness Criteria® - Soft Tissue Masses. <https://acsearch.acr.org/docs/69434/Narrative/>. Published 2017.

Lebowitz C, Matzon JL. Arterial injury in the upper extremity evaluation, strategies, and anticoagulation management. *Hand Clin*. 2018; 34(1):85-95.

Madani H, Farrant J, Chhaya N, et al. Peripheral limb vascular malformations: An update of appropriate imaging and treatment options of a challenging condition. *Br J Radiol*. 2015; 88(1047):20140406.

McMahan ZH, Wigley FM. Raynaud's phenomenon and digital ischemia: A practical approach to risk stratification, diagnosis and management. *Int J Clin Rheumtol*. 2010; 5(3):355-70.

Menke J, Larsen J. Meta-analysis: Accuracy of contrast-enhanced magnetic resonance angiography for assessing steno-occlusions in peripheral arterial disease. *Ann Intern Med*. 2010; 153(5):325-334. doi: 10.7326/0003-4819-153-5-201009070-00007.

Nguyen N, Sharma A, West JK, et al. Presentation, clinical features, and results of intervention in upper extremity fibromuscular dysplasia. *J Vasc Surg*. 2017 Aug; 66(2):554-563.

Obara P, McCool J, Kalva SP, et al. ACR Appropriateness Criteria clinically suspected vascular malformation of the extremities. *J Am Coll Radiol*. 2019 Nov; 16(11S):S340-S347.

Pollak AW, Norton P, Kramer CM. Multimodality imaging of lower extremity peripheral arterial disease: Current role and future directions. *Circ Cardiovasc Imaging*. 2012 Nov 1; 5(6):797-807.

Rosyd FN. Etiology, pathophysiology, diagnosis and management of diabetics' foot ulcer. *Int J Res Med Sci*. 2017 Oct; 5(10):4206-4213.

Sharma AM, Norton PT, Zhu D. Conditions presenting with symptoms of peripheral arterial disease. *Semin Intervent Radiol*. 2014; 31(4):281-291. <http://doi.org/10.1055/s-0034-1393963>.

Verikokos C, Karaolani G, Doulaptis M, et al. Giant popliteal artery aneurysm: case report and review of the literature. *Case Rep Vasc Med*. 2014; 2014:780561.

Wani ML, Ahangar AG, Ganie FA, et al. Vascular injuries:Trends in management. *Trauma Mon*. 2012; 17(2):266-269.

**Weiss C, Azene ER, Azene EM, et al. American College of Radiology (ACR). ACR Appropriateness Criteria® - Sudden Onset of Cold, Painful Leg. J Am Coll Radiol. 2017 May; 14(5Suppl):S307-S313.**

Wong VW, Major MR, Higgins JP. Nonoperative management of acute upper limb ischemia. *Hand (NY)*. 2016; 11(2):131-143. doi:10.1177/1558944716628499.

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Reviewed / Approved by NIA Clinical Guideline Committee

### 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.

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