

AmeriHealth Caritas Louisiana

National Imaging Associates, Inc.*	
Clinical guidelines SPINAL CANAL MRA	Original Date: May 2008
CPT Codes: 72159	Last Revised Date: February 2021
Guideline Number: NIA_CG_046	Implementation Date: January 2022

INDICATIONS FOR SPINAL CANAL ~~Magnetic Resonance Angiography~~ MAGNETIC RESONANCE ANGIOGRAPHY (MRA):

- For the evaluation of spinal arteriovenous malformation (AVM) (Amarouche, 2015; [Saindane, 2015](#); Mathur, 2017; NINDS, 2019; [Saindane, 2015](#); Shin, 2019)
- Myelopathy when the suspected etiology is a compromise of blood flow or drainage to the spinal cord (ACR, ~~2015~~2020; Vargas, 2015).
- For the evaluation of a known cervical spine fracture, disc herniation, infection, or venous thrombosis where there is concern for vascular pathology (compression or thrombosis) compromising spinal cord blood flow or venous drainage (ACR, ~~2015~~2020; Vargas, 2015).
- For the evaluation of known or suspected vertebral artery injury when there is also concern for vascular compromise to the spinal canal and its contents (otherwise Neck MRA or CTA is sufficient to evaluate vertebral artery injury) (Goldberg, 2010; Montalvo, 2018).
- Preoperative evaluation (e.g., localization of the spinal arteries prior to complex spinal surgery, aortic aneurysm repair, or characterization of suspected vascular lesion of the spinal canal and its contents) (Backes, 2008; Mordasini, 2011; Vargas, 2010).
- 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 (Mathur, 2017).

BACKGROUND

Application of spinal magnetic resonance angiography (MRA) allows for more effective and noninvasive screening for vascular lesions than magnetic resonance imaging (MRI) alone. It may improve characterization of normal and abnormal intradural vessels while maintaining good spatial resolution. Spinal MRA may be used for the evaluation of spinal arteriovenous malformations, as well as injuries to blood vessels supplying the spine and cord.

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OVERVIEW

Spinal MR Angiography/MR Venography - Typically, contrast-enhanced 3D time of flight techniques and contrast-enhanced CT angiography (CTA) are used for evaluation of the spinal arteries veins, and related pathology as a non-invasive alternative to the gold standard catheter angiography. The detection rate of the Adamkiewicz artery (AKA) by MRA is in the range of 69-100%, but with modern equipment both MRA and CTA detection rates should approach 100% (Backes, 2008). Magnetic resonance angiography is well suited to patients who cannot receive iodinated contrast and undergo CTA. CTA has the advantage over MRA of providing greater spatial resolution, can image the entire spine during one contrast bolus, and provides for a faster exam time that is less prone to motion artifact. MRA is limited by a finite field of view, typically ≤ 50 cm (Backes, 2008). MRI has the advantage over CT of **being able to detect** areas of ischemia **through the use of** diffusion weighted imaging. Mathur et al showed a 100% sensitivity in detecting recurrent spinal arteriovenous fistulas post-treatment (Mathur, 2017).

Spinal Arteriovenous Malformations (AVMs) – Spinal cord arteriovenous malformations are comprised of snarled tangles of arteries and veins **which that** affect the spinal cord. They are fed by spinal cord arteries and drained by spinal cord veins. **Spinal dural arteriovenous (AV) fistulas are the most commonly encountered most encountered vascular malformation of the spinal cord and are a treatable cause of progressive paraparesis.** Magnetic resonance angiography (MRA) can record the pattern and velocity of blood-flow through vascular lesions as well as the flow of cerebrospinal fluid throughout the spinal cord. MRA **is utilized to** define the vascular malformation and may assist in determining treatment (NIH, 2015).

Spinal Arteries/Veins - Vascular malformations, trauma, disc herniations, neoplasms, and coagulopathies or infection causing thrombosis can compromise the spinal cord blood supply and drainage. The spinal cord arterial supply is derived from the anterior spinal artery, posterolateral spinal artery, and the arteria radicularis magna or artery of Adamkiewicz (AKA). The anterior spinal artery supplies the anterior two-thirds of the cord and arises from the vertebral arteries. It receives contributions from the ascending cervical artery, the inferior thyroid artery, the intercostal arteries, the lumbar artery, the iliolumbar artery, lateral sacral arteries, and the artery of Adamkiewicz. The AKA arises on the left side of the aorta between the T8 and L1 segments, to anastomose with the anterior spinal artery and supply the lower two-thirds of the spinal **cord**. Two posterolateral spinal arteries arise from the posteroinferior cerebellar arteries and supply the posterior third (posterior columns, posterior roots, and dorsal horns) of the spinal cord. The spinal venous system is divided into intrinsic and extrinsic veins differentiated by their location within the spinal canal or extrinsic to the canal, respectively. They drain into the radiculomedullary veins, subsequently to paravertebral and intervertebral plexuses, then to the segmental veins that eventually drain into the ascending lumbar veins, azygos system, and pelvic venous plexuses (Vargas, 2015).

POLICY HISTORY

Date	Summary
February 2021	<u>Updated background information and references</u>
<u>May 2020</u>	<ul style="list-style-type: none">• <u>Reordered indications and background information</u>• <u>Updated references</u>
<u>June 2019</u>	<u>Updated background information and references</u>

~~June 2019~~

~~Updated background information and references~~

~~May 2020~~

~~Reordered indications and background information~~

~~Updated references~~

REFERENCES

Amarouche M, Hart JL, Siddiqui A, et al. Time-resolved contrast-enhanced MR Angiography of spinal vascular malformations. *AJNR Am J Neuroradiol*. 2015 Feb; 36(2):417-422.

American College of Radiology (ACR). ACR Appropriateness Criteria®. Myelopathy. <http://www.acr.org/Quality-Safety/Appropriateness-Criteria/Diagnostic>. Published ~~2015~~2020.

Backes WH, Nijenhuis RJ. Advances in spinal cord MR angiography. *AJNR Am J Neuroradiol*. 2008 Apr; 29(4):619-631. doi: <https://doi.org/10.3174/ajnr.A0910>. <http://www.ajnr.org/content/29/4/619>. Retrieved March 16, 2018.

[Saindane AM, Boddu SR, Tong FC, Dehkharghani S, Dion JE. Contrast-enhanced time-resolved MRA for pre-angiographic evaluation of suspected spinal dural arterial venous fistulas. J Neurointerv Surg. 2015 Feb;7\(2\):135-40. doi: 10.1136/neurintsurg-2013-010981. Epub 2014 Jan 24. PMID: 24463440.](#)

Goldberg AL, Kershah SM. Advances in imaging of vertebral and spinal cord injury. *J Spinal Cord Med*. 2010; 33(2):105–116. doi:10.1080/10790268.2010.11689685.

Mathur S, Symons SP, Huynh TJ, et al. First-pass contrast-enhanced MR angiography in evaluation of treated spinal arteriovenous fistulas: Is catheter angiography necessary? *AJNR Am J Neuroradiol*. January 2017; 38(1):200-205; doi: <https://doi.org/10.3174/ajnr.A4971>. <http://www.ajnr.org/content/38/1/200>. Retrieved March 27, 2018.

Montalvo M, Bayer A, Azher I, et al. Spinal cord infarction because of spontaneous vertebral artery dissection. *Stroke*. 2018 Nov; 49(11):e314-e317. <https://doi.org/10.1161/STROKEAHA.118.022333>.

Mordasini P, El-Koussy M, Schmidli J, et al. Preoperative mapping of arterial spinal supply using 3.0-T MR angiography with an intravascular contrast medium and high-spatial-resolution steady-state. *Eur J Radiol*. 2012 May; 81(5):979-84. doi:10.1016/j.ejrad.2011.02.025. Epub 2011 Mar 4.

National Institute of Neurological Disorders and Stroke (NINDS), National Institutes of Health (NIH). Arteriovenous Malformations and other Vascular Lesions of the Central Nervous System: Fact Sheet. Bethesda, Maryland: NIH Publication No. 04-4854. Revised 2019.

[Saindane AM, Boddu SR, Tong FC, et al. Contrast-enhanced time-resolved MRA for pre-angiographic evaluation of suspected spinal dural arterial venous fistulas. J Neurointerv Surg. 2015 Feb; 7\(2\):135-40. Epub 2014 Jan 24.](#)

Shin JH, Choi Y, Park B, et al. Diagnostic accuracy and efficiency of combined acquisition of low-dose time-resolved and single-phase high-resolution contrast-enhanced magnetic resonance

angiography in a single session for pre-angiographic evaluation of spinal vascular disease. PLOS ONE. 2019 Mar 28; 14(3):e0214289.

Vargas MI, Gariani J, Sztajzel R, et al. Spinal cord ischemia: Practical imaging tips, pearls, and pitfalls. *AJNR Am J Neuroradiol*. May 2015; 36(5):825-830. doi: <https://doi.org/10.3174/ajnr.A41118>. <http://www.ajnr.org/content/36/5/825>. Retrieved March 27, 2018.

Vargas MI, Nguyen D, Viallon M, et al. Dynamic MR angiography (MRA) of spinal vascular diseases at 3T. *Eur Radiol*. 2010; 20:2491–2495. <https://doi.org/10.1007/s00330-010-1815-6>.

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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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