

## MRA/MRV: MR Angiography in the Emergency Room

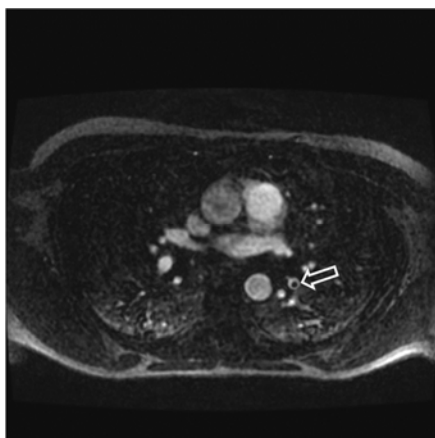
**Purpose:** The purpose of this educational course is to review the MR Angiography (MRA) indications, sequences, and findings in the evaluation of patients with suspected acute vascular diseases, including (1) acute pulmonary embolism, (2) acute aortic syndrome, (3) acute mesenteric ischemia, and (4) peripheral vascular disease. In addition, we will review the current evidence available on the accuracy of MRA for making the correct diagnosis of these pathologies.

**Background:** Acute chest, abdominal or extremity pain is a very frequent indication for presentation to the emergency department, for which these critical diagnoses require rapid and accurate diagnosis. Computed Tomography Angiography (CTA) plays an integral role in the initial diagnosis and management of patients with suspected acute vascular disease. This has led to the ubiquitous use of CTA to rapidly and accurately exclude acute vascular diseases. As a result of improvements in MRA techniques and a growing awareness of the radiation risks of CT, MRA is being used more frequently in the diagnostic work-up of younger, hemodynamically stable patients in the emergency department.

### Outline of Content:

1. MRA for pulmonary embolism (Figure 1)
  - a. What are the limitations of CTA for PE?
  - b. How are whole chest coverage and isotropic, high-spatial resolution achieved in a very rapid image acquisition?
  - c. What artifacts are frequently encountered with pulmonary MRA?
  - d. What data have been published on the role of MRA for PE?
2. MRA for acute aorta syndrome (Figure 2)
  - a. What are the differences between aortic dissection (AD), intramural hematoma (IMH) and penetrating atherosclerotic ulcer (PAU)?
  - b. What MRI techniques are used for diagnosing AD, IMH and PAU?
    - i. Can non-contrast-enhanced MRA techniques be used?
  - c. What does the referring clinician need to know in patients with AD?
3. MRA for acute abdominal pain (Figure 3)
  - a. When should MRI be performed in patients with suspected mesenteric ischemia?
  - b. What are causes of acute mesenteric ischemia?
  - c. What does referring physician need to know in patients with acute mesenteric ischemia?
4. MRA for acute peripheral vascular disease (Figure 4)
  - a. What are differences between peripheral CTA and MRA?
    - i. When is CTA appropriate?
    - ii. When is MRA appropriate?
  - b. What evidence is available to support the use of MRA in the evaluation of acute extremity ischemia?

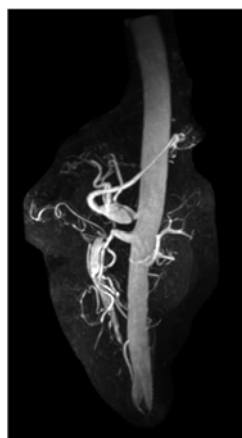
**Summary:** Although CT and CTA remain the “gold standard” for the diagnosis of pulmonary embolism, acute aorta syndrome, acute abdominal pain and acute lower extremity ischemia, MRA is increasingly being used to evaluate patients presenting to the emergency department with acute symptoms. This is particularly true for the work-up of younger patients in whom minimizing exposure to ionizing radiation is important.



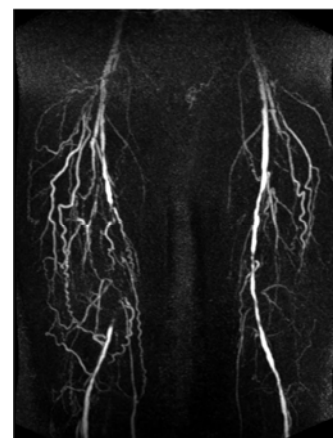
**Figure 1** – 33 year-old female with acute left lower lobe pulmonary embolus (arrow).



**Figure 2** – 67 year-old male with acute descending aortic dissection (arrow).



**Figure 3** – 56 year-old with acute SMA and celiac dissections.



**Figure 4** – 76 year-old male with right superficial femoral artery occlusion.