

Prevalence and Significance of Non-thrombotic findings on Pulmonary Magnetic Resonance Angiography performed to evaluate for acute Pulmonary Embolism

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Target Audience: Radiologists and Emergency Department Physicians

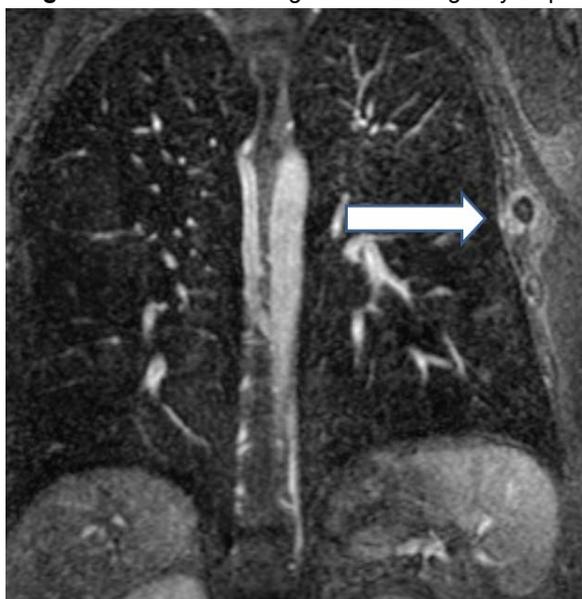


Figure 1: Example of Category B ancillary non-thrombotic finding (Left Rib fracture).

Purpose: We sought to determine the frequency and significance of non-thrombotic ancillary findings in patients that had Magnetic Resonance Angiography as a first line test to exclude pulmonary embolism (MRA-PE).

Methods: This was a single site IRB- and HIPAA-compliant retrospective review of the non-thrombotic imaging findings found in MRA-PE examinations performed on patients as their first line imaging test to rule out pulmonary embolism. We performed a review of the final MRA-PE dictation and images and recorded the presence of the relevant non-thrombotic ancillary findings according to the CTA-PE methodology proposed by Richman¹: (A) significant and requiring intervention, (B) non-emergent but requiring imaging or clinical follow-up, (C) incidental findings or normal variants requiring no follow up, and (D) indeterminate findings. For those patients with more than one finding, only the single most important ancillary finding was recorded. The relative percentage of MRA-PE ancillary findings by relevance category was then compared with those percentages found for CTA-PE¹ and compared using Fisher's exact test.

Results: A total of 254 patients (52 male: 202 female; age range 11-92 years, median 33.5 years; average 37 ± 15.86 years) were evaluated for possible pulmonary embolism using MRA-PE as the primary diagnostic imaging modality in this series and had a negative exam. There were 16/254 (6%) cases of Category A ancillary findings (needing immediate intervention): 11 patients with pneumonia, 4 patients with lung or hilar masses, and one case of pericarditis. There were 30/254 (12%) cases of Category B ancillary findings (requiring follow-up): 7 with pleural effusions, 7 with liver lesions, 4 with cardiomegaly, 2 with pericardial effusions, 2 with rib fractures, 2 with enlarged sternoclavicular joint, 1 with a chest wall hematoma. Significantly fewer cases of Category C (2/254=0.8%; p<0.001) and Category D (0/254 =0%; p<0.001) incidental ancillary findings were found at MRA-PE (Table 1).¹

Category of non-thrombotic ancillary findings (A-D)	CTA-PE ancillary findings (cases/total) ±95% C.I. ¹	MRA-PE ancillary findings (cases/total) ±95% C.I.	p value
Category A (Significant requiring intervention)	7.3% (67/921) ± 5.7-9.1%	6% (16/254) ± 3.9-10.1%	0.68
Category B (Non-emergent needing F/U)	10.0% (93/921) ± 8.2-12.2%	12% (30/254) ± 8.4-16.4%	0.42
Category C (Incidental needing no F/U)	16.7% (154/921) ± 10-20%	0.8% (2/254) ± 0.0-3.1%	<0.001
Category D (Indeterminant needing no F/U)	0.04% (39/921) ± 3.0-5.5%	0% (0/254) ± 0.0-1.8%	<0.001

Table 1: Comparison of the frequency and severity of non-thrombotic ancillary findings as an explanation for chest pain found on MRA-PE contrasted to CTA-PE data from Richman et al.¹ (Abbreviation Key: F/U- follow-up)

Discussion: In this single site retrospective review we found a prevalence of 6% for Category A ancillary findings (needing immediate intervention) and 12% for Category B findings (non-emergent but requiring follow-up). These non-thrombotic ancillary findings may have been the primary cause of chest pain (or dyspnea) for these patients. The MRA-PE data for ancillary findings are similar to Richman's data for CTA-PE¹ for the two important Categories (A&B) but are significantly lower (p<0.001) for the insignificant ancillary categories (C & D). This may be related to the younger group of patients imaged in this study when compared to the Richman data. Those non-significant Category C non-thrombotic findings that are not easily observed on MRA-PE include: COPD, asbestos related lung disease, kidney stones, and small lung nodules. Thus, MRA-PE does not overlook significant non-thrombotic findings in patients presenting with acute symptoms from the emergency department being studied for possible pulmonary embolism.

Conclusion: In the acute setting, clinically significant non-thrombotic ancillary findings, that may provide an alternative explanation for a patient's chest pain, are found on MRA-PE exams with the same relative frequency as CTA-PE, while less significant incidental findings are not identified.

References: 1. Richman et al Acad Emer Med 2004; 11:642–647.