

**American College of Radiology
ACR Appropriateness Criteria®**

Workup of Noncerebral Systemic Arterial Embolic Source

Variant 1: Known upper extremity arterial occlusion. Suspected embolic etiology. Next imaging study to determine source.

| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations | | | | | | | | |
|---|--------------------------|--------|----------------|---------------------|--------|--------|-------------------|---|---|---|---|---|---|----|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| CT heart function and morphology with IV contrast | Usually appropriate | Strong | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 13 | 0 |

| References | Study Quality |
|---------------|---------------|
| 40 (25018846) | 4 |
| 39 (10992020) | 4 |
| 38 (19179202) | 2 |
| 37 (31738598) | 4 |
| 36 (29555833) | 2 |
| 35 (22342878) | 4 |
| 34 (29374188) | 2 |
| 33 (29330651) | 3 |
| 32 (25751618) | 2 |
| 31 (23821020) | 2 |
| 30 (26178177) | Good |
| 29 (29961869) | Good |
| 28 (23406625) | Good |
| 27 (19356536) | 1 |
| 26 (26341605) | 4 |
| 25 (30801566) | 1 |
| 24 (28740038) | 2 |

| | |
|---------------|---|
| 11 (21145267) | 4 |
| 16 (19251175) | 4 |
| 17 (22723539) | 4 |

| | | | | | | | | | | | | | | | |
|---------------------------|-------------------------|------------------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|
| US duplex Doppler abdomen | Usually not appropriate | Expert Consensus | 0 0 mSv | 0 0 mSv [ped] | 1 | 1 | 11 | 4 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
|---------------------------|-------------------------|------------------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|

Variante 2: Known arterial occlusion in the mesenteric or renal arterial system or renal infarcts. Suspected embolic etiology. Next imaging study to determine source.

| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations | | | | | | | | |
|---|--------------------------|--------|------------|---------------|--------|--------|-------------------|---|---|---|---|---|---|----|---|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| US echocardiography transthoracic resting | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 10 | 2 |

| References | Study Quality |
|---------------|---------------|
| 54 (1987242) | 1 |
| 53 (16946152) | 3 |
| 49 (26476503) | 1 |
| 46 (16824834) | 3 |
| 52 (27256218) | 4 |
| 2 (25747606) | 3 |

| | | | | | | | | | | | | | | | |
|----------------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|----|---|---|
| CTA chest with IV contrast | Usually appropriate | Limited | ⊕⊕⊕ 1-10 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 3 | 13 | 0 | 0 |
|----------------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|----|---|---|

| References | Study Quality |
|---------------|---------------|
| 13 (21529769) | 4 |
| 12 (29150083) | 2 |
| 41 (10966185) | 4 |

| | | | | | | | | | | | | | | | |
|--|---------------------|---------|----------------|--|---|---|---|---|---|---|---|---|---|---|---|
| CTA chest and abdomen with IV contrast | Usually appropriate | Limited | ⊕⊕⊕⊕ 10-30 mSv | | 7 | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 8 | 7 | 0 |
|--|---------------------|---------|----------------|--|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 57 (19770313) | 4 |
| 56 (21482138) | 4 |

| | |
|---------------|---|
| 13 (21529769) | 4 |
| 12 (29150083) | 2 |
| 41 (10966185) | 4 |

| | | | | | | | | | | | | | | | |
|---|---------------------|--------|----------------|---------------------|---|---|---|---|---|---|---|---|----|---|---|
| CT heart function and morphology with IV contrast | Usually appropriate | Strong | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 7 | 0 |
|---|---------------------|--------|----------------|---------------------|---|---|---|---|---|---|---|---|----|---|---|

| References | Study Quality |
|---------------|---------------|
| 40 (25018846) | 4 |
| 39 (10992020) | 4 |
| 38 (19179202) | 2 |
| 37 (31738598) | 4 |
| 36 (29555833) | 2 |
| 35 (22342878) | 4 |
| 34 (29374188) | 2 |
| 33 (29330651) | 3 |
| 32 (25751618) | 2 |
| 31 (23821020) | 2 |
| 30 (26178177) | Good |
| 29 (29961869) | Good |
| 28 (23406625) | Good |
| 27 (19356536) | 1 |
| 26 (26341605) | 4 |
| 25 (30801566) | 1 |
| 24 (28740038) | 2 |
| 23 (29218612) | 2 |
| 22 (20809409) | 2 |
| 21 (27601228) | 2 |
| 20 (22495682) | 1 |
| 19 (21757676) | 1 |
| 18 (19366905) | 1 |

| | | | | | | | | | | | | | | | |
|--|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|
| MRA chest and abdomen without and with IV contrast | Usually appropriate | Strong | ○ 0 mSv | ○ 0 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 1 | 12 | 4 | 0 |
|--|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|

| References | Study Quality |
|---------------|---------------|
| 44 (17285264) | 2 |
| 43 (20013276) | 3 |
| 58 (24935911) | 2 |
| 57 (19770313) | 4 |
| 56 (21482138) | 4 |

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|---|---------------------|----------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| MRI heart function and morphology without IV contrast | Usually appropriate | Moderate | 0 0 mSv | 0 0 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 1 | 6 | 8 | 2 | 0 |
|---|---------------------|----------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 49 (26476503) | 1 |
| 45 (29374292) | Good |

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|--|---------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|
| MRI heart function and morphology without and with IV contrast | Usually appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 1 | 11 | 5 | 0 |
|--|---------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|

| References | Study Quality |
|---------------|---------------|
| 48 (23793590) | 4 |
| 47 (17313647) | 4 |
| 46 (16824834) | 3 |
| 45 (29374292) | Good |
| 39 (10992020) | 4 |
| 37 (31738598) | 4 |
| 29 (29961869) | Good |

| | | | | | | | | | | | | | | | |
|-------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|
| US echocardiography transesophageal | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 3 | 12 | 2 | 0 |
|-------------------------------------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|----|---|---|

| References | Study Quality |
|---------------|---------------|
| 51 (23186295) | 4 |
| 50 (31236074) | 3 |
| 46 (16824834) | 3 |
| 31 (23821020) | 2 |
| 13 (21529769) | 4 |
| 10 (19995630) | 4 |
| 4 (24523417) | 3 |

| | |
|---------------|---|
| 46 (16824834) | 3 |
| 52 (27256218) | 4 |
| 2 (25747606) | 3 |

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|----------------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|----|---|---|
| CTA chest with IV contrast | Usually appropriate | Limited | ☹☹☹ 1-10 mSv | ☹☹☹☹ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 2 | 14 | 0 | 0 |
|----------------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|----|---|---|

| | |
|---------------|---------------|
| References | Study Quality |
| 13 (21529769) | 4 |
| 12 (29150083) | 2 |
| 41 (10966185) | 4 |

| | | | | | | | | | | | | | | | |
|---|---------------------|--------|----------------|---------------------|---|---|---|---|---|---|---|---|----|---|---|
| CT heart function and morphology with IV contrast | Usually appropriate | Strong | ☹☹☹☹ 10-30 mSv | ☹☹☹☹ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 5 | 2 |
|---|---------------------|--------|----------------|---------------------|---|---|---|---|---|---|---|---|----|---|---|

| | |
|---------------|---------------|
| References | Study Quality |
| 40 (25018846) | 4 |
| 39 (10992020) | 4 |
| 38 (19179202) | 2 |
| 37 (31738598) | 4 |
| 36 (29555833) | 2 |
| 35 (22342878) | 4 |
| 34 (29374188) | 2 |
| 33 (29330651) | 3 |
| 32 (25751618) | 2 |
| 31 (23821020) | 2 |
| 30 (26178177) | Good |
| 29 (29961869) | Good |
| 28 (23406625) | Good |
| 27 (19356536) | 1 |
| 26 (26341605) | 4 |
| 25 (30801566) | 1 |
| 24 (28740038) | 2 |
| 23 (29218612) | 2 |

| | | | | | | | | | | | | | | | | | | |
|--|-------------------------|---------|----------------|---------------|---------------|---|---|---|---|---|---|----|---|---|---|--|--|--|
| | | | 10 (19995630) | | 4 | | | | | | | | | | | | | |
| | | | 4 (24523417) | | 3 | | | | | | | | | | | | | |
| | | | 2 (25747606) | | 3 | | | | | | | | | | | | | |
| MRA chest without IV contrast | May be appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 6 | 6 | 0 | 0 | 0 | 1 | 6 | 4 | 5 | 0 | 0 | | | |
| | | | References | | Study Quality | | | | | | | | | | | | | |
| | | | 44 (17285264) | | 2 | | | | | | | | | | | | | |
| | | | 43 (20013276) | | 3 | | | | | | | | | | | | | |
| MRA chest abdomen pelvis without IV contrast | May be appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 6 | 6 | 0 | 0 | 0 | 0 | 2 | 10 | 4 | 1 | 0 | | | |
| | | | References | | Study Quality | | | | | | | | | | | | | |
| | | | 58 (24935911) | | 2 | | | | | | | | | | | | | |
| | | | 57 (19770313) | | 4 | | | | | | | | | | | | | |
| | | | 56 (21482138) | | 4 | | | | | | | | | | | | | |
| | | | 44 (17285264) | | 2 | | | | | | | | | | | | | |
| | | | 43 (20013276) | | 3 | | | | | | | | | | | | | |
| Aortography chest abdomen pelvis | Usually not appropriate | Limited | ☢☢☢☢ 10-30 mSv | | 3 | 3 | 3 | 4 | 6 | 3 | 1 | 0 | 0 | 0 | 0 | | | |
| | | | References | | Study Quality | | | | | | | | | | | | | |
| | | | 17 (22723539) | | 4 | | | | | | | | | | | | | |
| | | | 16 (19251175) | | 4 | | | | | | | | | | | | | |
| | | | 11 (21145267) | | 4 | | | | | | | | | | | | | |
| US duplex Doppler abdomen | Usually not appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 3 | 3 | 3 | 2 | 4 | 2 | 4 | 2 | 0 | 0 | 0 | | | |
| | | | References | | Study Quality | | | | | | | | | | | | | |
| | | | 56 (21482138) | | 4 | | | | | | | | | | | | | |

Variant 4: Known multiorgan system arterial occlusions. Suspected embolic etiology. Next imaging study to determine source.

| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations | | | | | | | | | |
|--|--------------------------|---------|----------------|---------------------|--------|--------|-------------------|---|---|---|---|---|---|----|---|--|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| CT heart function and morphology with IV contrast | Usually appropriate | Strong | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 11 | 3 | |
| | | | References | | | | | | | | | | | | | |
| | | | 40 (25018846) | | | | | | | | | | | | | |
| | | | 39 (10992020) | | | | | | | | | | | | | |
| | | | 38 (19179202) | | | | | | | | | | | | | |
| | | | 37 (31738598) | | | | | | | | | | | | | |
| | | | 36 (29555833) | | | | | | | | | | | | | |
| | | | 35 (22342878) | | | | | | | | | | | | | |
| | | | 34 (29374188) | | | | | | | | | | | | | |
| | | | 33 (29330651) | | | | | | | | | | | | | |
| | | | 32 (25751618) | | | | | | | | | | | | | |
| | | | 31 (23821020) | | | | | | | | | | | | | |
| | | | 30 (26178177) | | | | | | | | | | | | | |
| | | | 29 (29961869) | | | | | | | | | | | | | |
| | | | 28 (23406625) | | | | | | | | | | | | | |
| | | | 27 (19356536) | | | | | | | | | | | | | |
| | | | 26 (26341605) | | | | | | | | | | | | | |
| | | | 25 (30801566) | | | | | | | | | | | | | |
| | | | 24 (28740038) | | | | | | | | | | | | | |
| | | | 23 (29218612) | | | | | | | | | | | | | |
| | | | 22 (20809409) | | | | | | | | | | | | | |
| | | | 21 (27601228) | | | | | | | | | | | | | |
| | | | 20 (22495682) | | | | | | | | | | | | | |
| | | | 19 (21757676) | | | | | | | | | | | | | |
| | | | 18 (19366905) | | | | | | | | | | | | | |
| MRI heart function and morphology without and with IV contrast | Usually appropriate | Limited | ○ 0 mSv | ○ 0 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 12 | 1 | |

| References | Study Quality |
|---------------|---------------|
| 48 (23793590) | 4 |
| 47 (17313647) | 4 |
| 46 (16824834) | 3 |
| 45 (29374292) | Good |
| 39 (10992020) | 4 |
| 37 (31738598) | 4 |
| 29 (29961869) | Good |

| | | | | | | | | | | | | | | | |
|---|---------------------|--------|-------|-------------|---|---|---|---|---|---|---|---|---|----|---|
| US echocardiography transthoracic resting | Usually appropriate | Strong | 0 mSv | 0 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 10 | 3 |
|---|---------------------|--------|-------|-------------|---|---|---|---|---|---|---|---|---|----|---|

| References | Study Quality |
|---------------|---------------|
| 54 (1987242) | 1 |
| 53 (16946152) | 3 |
| 49 (26476503) | 1 |
| 46 (16824834) | 3 |
| 52 (27256218) | 4 |
| 2 (25747606) | 3 |

| | | | | | | | | | | | | | | | |
|----------------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|
| CTA chest with IV contrast | Usually appropriate | Limited | ☹☹☹ 1-10 mSv | ☹☹☹☹ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 1 | 3 | 9 | 4 | 0 |
|----------------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 13 (21529769) | 4 |
| 41 (10966185) | 4 |
| 12 (29150083) | 2 |

| | | | | | | | | | | | | | | | |
|---|---------------------|---------|------------------|-----------------------|---|---|---|---|---|---|---|---|---|---|---|
| CTA chest abdomen pelvis with IV contrast | Usually appropriate | Limited | ☹☹☹☹☹ 30-100 mSv | ☹☹☹☹☹ 10-30 mSv [ped] | 7 | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 8 | 6 | 1 |
|---|---------------------|---------|------------------|-----------------------|---|---|---|---|---|---|---|---|---|---|---|

| References | Study Quality |
|---------------|---------------|
| 57 (19770313) | 4 |
| 56 (21482138) | 4 |
| 13 (21529769) | 4 |
| 12 (29150083) | 2 |

| | |
|---------------|---|
| 50 (31236074) | 3 |
| 46 (16824834) | 3 |
| 31 (23821020) | 2 |
| 13 (21529769) | 4 |
| 10 (19995630) | 4 |
| 4 (24523417) | 3 |
| 2 (25747606) | 3 |

| | | | | | | | | | | | | | | | |
|-------------------------------|--------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| MRA chest without IV contrast | May be appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 6 | 6 | 0 | 0 | 0 | 0 | 3 | 9 | 4 | 1 | 0 |
|-------------------------------|--------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| | |
|---------------|---------------|
| References | Study Quality |
| 44 (17285264) | 2 |
| 43 (20013276) | 3 |

| | | | | | | | | | | | | | | | |
|---------------------------|--------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| US duplex Doppler abdomen | May be appropriate | Limited | 0 0 mSv | 0 0 mSv [ped] | 4 | 4 | 4 | 2 | 2 | 3 | 6 | 0 | 0 | 0 | 0 |
|---------------------------|--------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| | |
|---------------|---------------|
| References | Study Quality |
| 56 (21482138) | 4 |

Appendix Key

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

Appropriateness Category: The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

SOE: Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- **Study Quality:** The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

RRL: Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

Rating: The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Median: The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Final tabulations: A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at www.acr.org/ac.