

Clinical Indications for CT Angiography in Lower Extremity Trauma

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Purpose: Computed tomographic angiography (CTA) is replacing conventional angiography as a rapid and accurate modality for diagnosis of suspected vascular injury in the traumatized lower extremity. We hypothesize that specific physical examination findings and injury patterns in lower extremity orthopaedic trauma patients are predictive of detection of a vascular injury by CTA. These findings may indicate or obviate ordering a CTA study in this context.

Methods: With IRB approval, investigators retrospectively reviewed physical examinations and injury patterns of 72 consecutive trauma patients at an academic Level I trauma center who underwent CTA of a lower extremity from 2006 through 2012. Outcomes included CTA detection of a vascular injury, additional imaging by duplex ultrasonography or angiography, operative or endovascular vascular intervention, and contrast-induced nephropathy (CIN).

Results: 40/72 (55.6%) diagnostic CTA studies demonstrated a vascular injury. 10/40 patients (25.0%) received specific vascular intervention. The positive predictive values (PPVs) of specific physical examination findings for predicting CTA detection of injury were dependent on the pattern of injury (table below). Normal physical examination led to observational management without incident, regardless of CTA findings. CTA was performed per published recommendations in 73.6% to 95.8% of cases, depending on criteria. CTA agreed with management in 95.8% of cases. CIN occurred in 4/72 cases (5.6%).

Conclusion: CTA is not indicated in lower extremity trauma when physical examination fails to demonstrate signs of vascular injury. Specific injuries and physical examination findings are predictive of CTA detection of vascular injury and may guide imaging and treatment decisions.

Table:
PPVs of Examination and Injury for Predicting CTA Detection of Lower Extremity Vascular Injury

| CTA Positives/Exam Positives | | Percent (%) | 95% CI* (%) |
|---------------------------------------|-------|-------------|-------------|
| All patients | | | |
| Any exam finding | 22/53 | 41.5 | 28.1-55.9 |
| Any soft exam finding | 16/46 | 34.8 | 21.4-50.2 |
| Diminished pulse | 10/32 | 31.3 | 16.1-50.0 |
| Asymmetry of color | 8/11 | 72.3 | 39.0-94.0 |
| Asymmetry of temperature | 8/17 | 47.1 | 23.0-72.2 |
| Any hard exam finding | 15/23 | 65.2 | 42.7-83.6 |
| Absent pulse | 15/20 | 75.0 | 50.9-91.3 |
| Only patients with low-risk injuries | | | |
| Any exam finding | 4/20 | 20.0 | 5.7-43.7 |
| Any soft exam finding | 3/18 | 16.7 | 3.6-41.1 |
| Any hard exam finding | 4/10 | 40.0 | 12.2-73.8 |
| Only patients with high-risk injuries | | | |
| Any exam finding | 18/33 | 54.5 | 36.4-71.9 |
| Any soft exam finding | 13/28 | 46.4 | 27.5-66.1 |
| Any hard exam finding | 11/13 | 84.6 | 54.6-98.1 |

*95% CI = 95% confidence interval.

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