Diagnostic Imaging Pathways - Leg Ischaemia (Acute)

Population Covered By The Guidance

This pathway provides guidance on the imaging of adult patients presenting with acute ischaemic leg.

Date reviewed: December 2015

Date of next review: December 2017

Published: March 2016

Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points.
Clicking on the PINK text box will bring up the full text.
The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

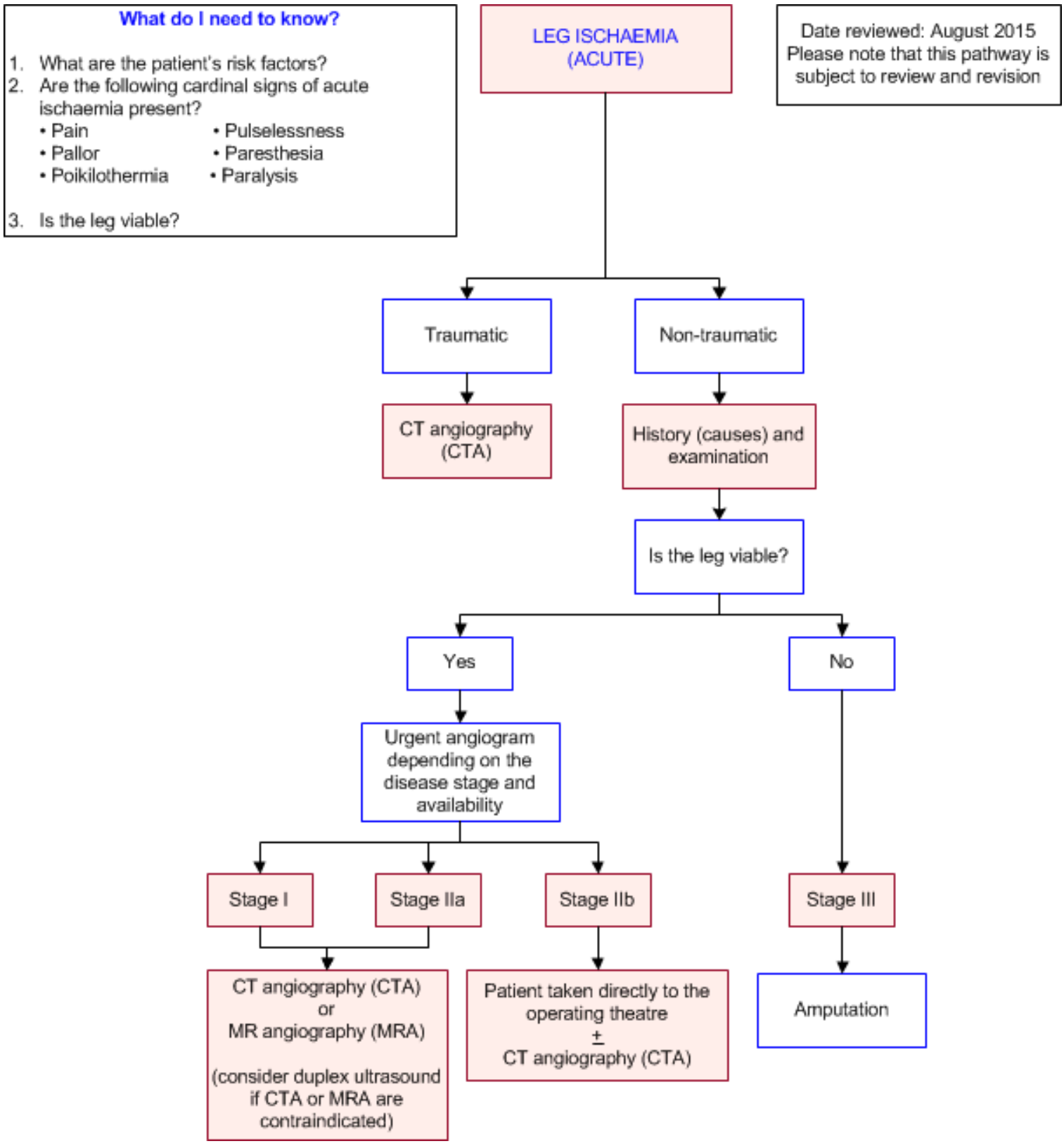

Image Gallery

Note: These images open in a new page

1a

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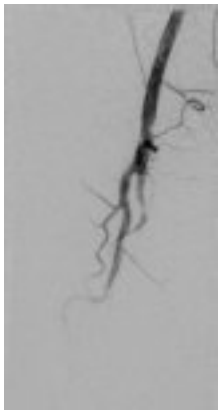

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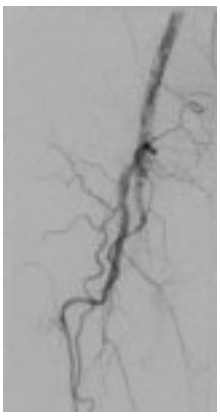
Right Superficial Femoral Artery Occlusion

Image 1 (Right Leg Angiogram): There is some mild aneurysmal dilatation of the distal aorta. No significant disease in the right-sided iliac. The superficial femoral artery (SFA) is occluded from its origin and there is refilling of the anterior tibial (AT) and posterior tibial (PT) arteries via collaterals (AT and PT arteries not illustrated).



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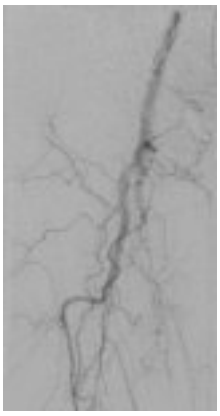

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Teaching Points

- The 6 P's (paresthesia, pain, pallor, pulselessness, poikilothermia, paralysis) are the classic cardinal signs of acute limb iscahemia
- Contrast-enhanced CTA is a non-invasive alternative to DSA (imaging gold standard in PAD) that requires less radiation, costs less, and has a high diagnostic accuracy
- In general, CTA depicts pelvic and leg arteries with good image quality; however, extensive calcification may hinder assessment of contrast-enhanced residual lumen, especially in the smaller (e.g. tibial) arteries
- Contrast enhanced magnetic resonance angiography (ceMRA) is the most accurate diagnostic technique for the detection of (50% or more) stenosis or occlusion

History (Causes) and Examination

- Causes of acute limb ischaemia include 1
    - Acute embolus
        - Atrial fibrillation (most common)

        - Recent myocardial infarction
        - Cardiac valve vegetation
        - Popliteal aneurysm (rarely aortic aneurysm)
        - Paradoxical secondary to deep vein thrombosis (rare)
    - Acute thrombosis
        - Atherosclerosis
        - Prior lower extremity revascularization (angioplasty / stent, bypass graft)
        - Trauma
        - Aortic dissection
- The 6 P's (paresthesia, pain, pallor, pulselessness, poikilothermia, paralysis) are the classic cardinal signs of acute limb iscahemia 1
- As part of the assessment, patients at risk, with a history or examination suggestive of peripheral arterial disease (PAD) should be assessed with a hand-held Doppler 2 as the quality of the lower extremity pulse examination can vary 1
- In general, the absence of any Doppler signals at the foot or ankle indicates significant ischemia, with a value

Magnetic Resonance Angiogram (contrast-enhanced MRA)

- Contrast enhanced magnetic resonance angiography (ceMRA) is the most accurate diagnostic technique for the detection of (50% or more) stenosis or occlusion, with most studies reporting sensitivities and specificities of over 90% (based on a "per segment" " rather than "per patient" analysis) 11,12
- In determining the diagnostic accuracy of duplex ultrasonography, magnetic resonance angiography, and computed tomography angiography, alone or in combination, for the assessment of lower limb peripheral arterial disease; ceMRA seems to be more specific than computed tomography angiography (CTA) in ruling out stenosis >50% and more sensitive than duplex ultrasonography in ruling in stenosis >50% respectively 11
- ceMRA and CTA were generally preferred by patients over contrast angiography (DSA) however this was subject to limited evidence. The review also revealed that magnetic resonance angiography was associated with the highest proportion of adverse events, although these were generally mild, with the most severe events associated with contrast angiography (DSA) 11
- A meta-analysis of 32 clinical trials comparing MRA to CA, the sensitivity and specificity to identify infra-popliteal PAD was 92% and 93% respectively. ceMRA correctly classified 95.3%, over-staged 3.1%, and under-staged 1.6% of arterial segments. It also showed that the pooled sensitivity and specificity for MRA of the tibiofibular arteries was lower than for the aorto-iliac or femoro-popliteal regions, but this difference was small 4
- Limitations to both these reviews were that the primary studies reported the diagnostic accuracy of MRA on a per-segment basis, not a per-patient basis
- A more recently published systematic review and meta-analysis of the diagnostic performance of CTA and ceMRA in patients with critical limb ischaemia and intermittent claudication showed that CTA and ceMRA are accurate techniques for evaluating disease severity of aorto-tibial arteries in patients with critical limb ischaemia and intermittent claudication. No significant differences in the diagnostic performance of the two techniques between patients with critical limb ischaemia and intermittent claudication were found. Methodological quality of studies was moderate to good. Key points identified include 13
    - CTA and ceMRA can both demonstrate arterial disease
    - CTA and CE-MRA can both accurately evaluate arteries in peripheral arterial disease

        - Diagnostic performances of critical limb ischaemia and intermittent claudication are not different
        - Separate imaging technique rather than bolus chase technique of tibial arteries by CE-MRA is preferred
        - CTA and CE-MRA can distinguish confidently between high-grade stenoses and occlusions
    - Disadvatages 4,14
        - Claustrophobia
        - Metal artefact from stent deployment (MR angiography cannot depict in-stent patency)
        - Contrast induced nephrogenic systemic fibrosis
        - Incompatibility with AICD and pacing devices
        - Excessive cost
    - Patients that should not receive gadolinium-based contrast agents because of the risk for nephrogenic systemic fibrosis include 4
        - Acute or chronic severe renal insufficiency (glomerular filtration rate

References

Date of literature search: December 2015

The search methodology is available on request. Email

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. Download the document

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