V 1.0
Review date: 08/24

T.I.G.E.R.

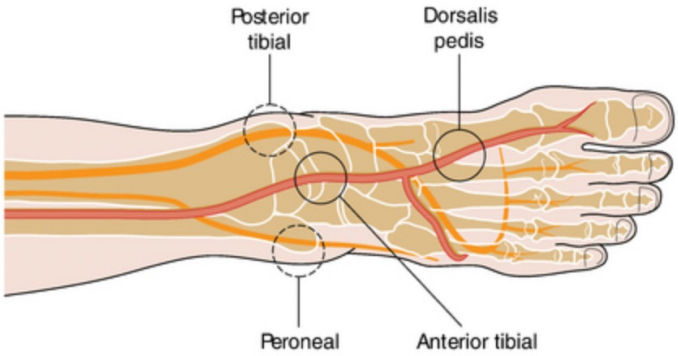
North East London & Essex Trauma Network

#5: Management and Escalation of extremity injury with potential arterial compromise – All ages

There are specific dislocations or fracture patterns that correlate with vascular injuries. The injuries include supracondylar fracture of the humerus, posterior knee dislocation, or tibial plateau fracture. These injuries correlate with high morbidity and mortality. Clinicians should maintain a low threshold of suspicion for arterial injury in all limb injuries, and especially in fractures or dislocations around the knee. Ischaemic limbs should be revascularized within 4 hours of injury, so rapid assessment and, if necessary, transfer, should be focus.

Situation

- Patients may present following a low energy transfer mechanism. E.g. fall from standing
- They may present independently of prehospital providers and 'walk-in'
- A pulse with normal volume on palpation can be present in 5% to 15% of patients with vascular injuries.
- Signs may be subtle and some degree of perfusion maintained (a warm, sensate limb with doppler signal does not rule out an arterial injury)
- Vascular injury may evolve (intimal injury to thrombus to ischaemia) and so repeated examination is required



If a **PALPABLE** pulse is not present an arterial injury should be assumed to be present ***until ruled out***.

Assessment

Hard Signs	Soft Signs
• Absent pulses • Signs of limb ischaemia/ compartment syndrome (the 6 Ps) • Bruit or thrill • Active or pulsatile haemorrhage • Pulsatile or expanding haematoma	• Proximity of injury to vascular structures • Major single nerve deficit (e.g. sciatic, femoral, median, ulna or radial) • Non-expanding haematoma • Reduced pulses • Posterior knee or anterior elbow dislocation • Hypotension or moderate blood loss at the scene

Action

- If a **PALPABLE** pulse is not present an arterial injury should be assumed to be present ***until ruled out***.
- The only definitive rule out is a CT Angiogram.
- If arterial injury is suspected, a CT Angiogram should be performed within 30 minutes and a written provisional report produced within a further 30 minutes*
- If a CT Angiogram cannot be performed within this timeframe the patient should be discussed with the Major Trauma Centre with a view to critical transfer.
- Early discussions should be held with the Major Trauma receiving Consultant on 020 3519 7165 at the Major Trauma Centre followed by a written referral via *referapatient.*
- The Royal London Hospital Major Trauma Centres will provide early joint consultant level decision-making from vascular surgery and orthopaedic surgery. This should include plastic surgery when fractures are open or there is suspected/confirmed nerve involvement.

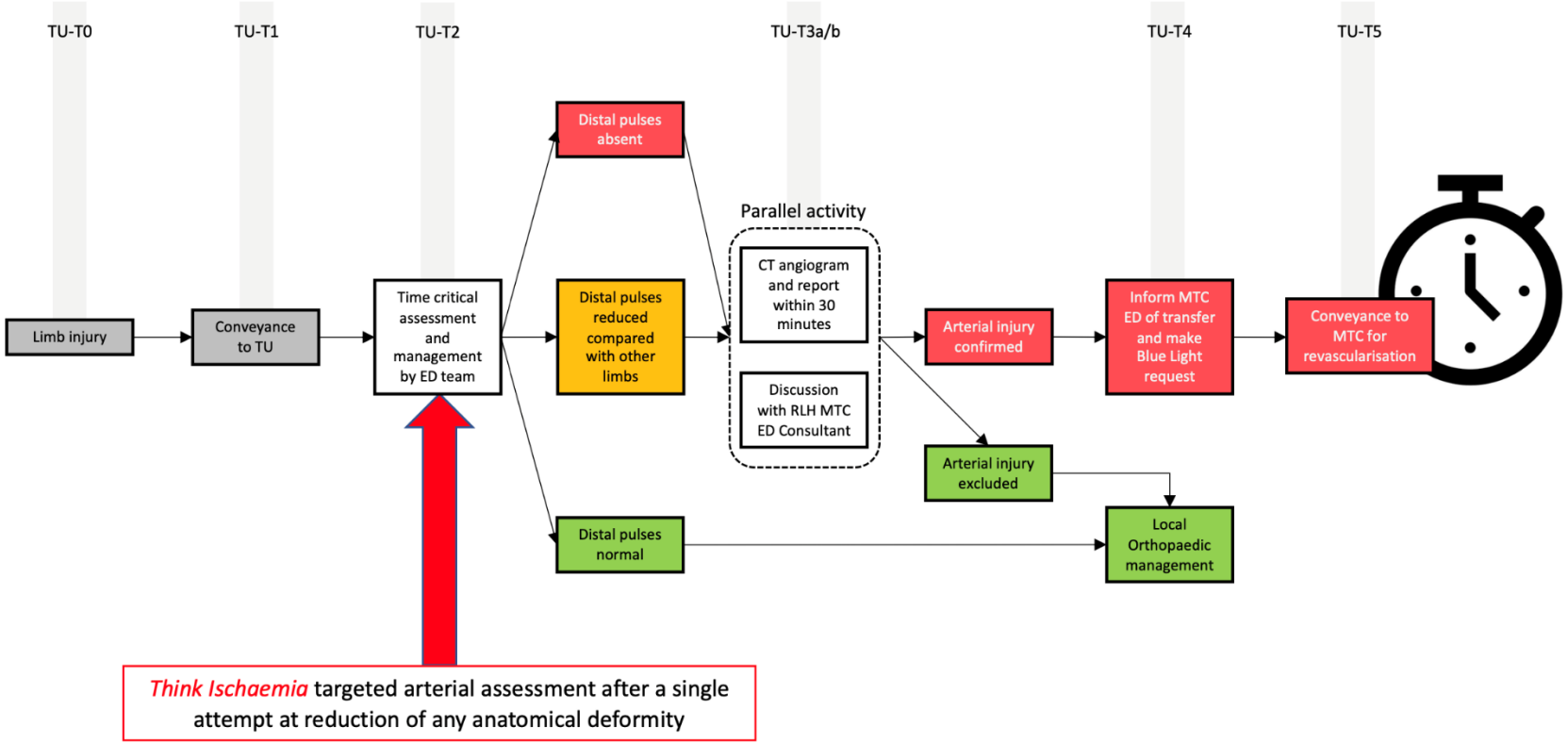
*unless associated life-threatening injury

Limb Injury Pathway – *Think Ischaemia, Think Time*

Trauma Unit Time Critical Management Pathway

North East London & Essex Trauma Network

*In the presence of a vascular injury, irreversible damage to muscle and nerves starts within **2-3 hours***



Appendix 1: Critical management pathway

Appendix 2: BOAST – updated April 2021

British Orthopaedic Association

BAPRAS
British Association of Plastic Reconstructive and Aesthetic Surgeons

VASCULAR SOCIETY
The Vascular Society for Great Britain and Ireland

BOA STANDARDS

Dec 2020

Diagnosis & Management of Arterial Injuries Associated With Extremity Fractures and Dislocations

Version 2.1*

Background and justification
Rapid, accurate diagnosis of arterial injuries to the extremities is crucial for optimum outcome with immediate referral to, and joint management with, a surgeon capable of performing vascular repair.

Inclusions
Patients of all ages with vascular injuries to the extremity associated with musculoskeletal trauma.

Standards for Practice

1. All hospitals and networks that are responsible for the management of injured patients must have clear emergency referral and transfer protocols that should include a single point of contact.
2. Centres providing definitive care must have an agreed protocol and pathway standardising the management of these complex injuries.
3. This protocol should include combined review and decision making in person by Consultant surgeons skilled in vascular repair and skeletal trauma on reception of the patient.
4. Haemorrhage should be controlled immediately by direct pressure or tourniquet. Blind clamping should not be undertaken.
5. A pulseless, deformed limb should be re-aligned, splinted and the vascular examination repeated and documented at the time of diagnosis and prior to transfer.
6. Neurological examination must be documented as a timed entry in all patients with extremity trauma; associated nerve injury should be presumed until disproven.
7. Any patient undergoing CT scan following major trauma should have a head to toe scanogram.
8. CT angiography of the extremity should occur immediately following the scanogram, without requirement for patient repositioning.
9. The ischaemic limb should be revascularised within four hours from injury.
10. Where rapid definitive restoration of arterial flow cannot be achieved, arterial shunts should be used to restore flow (eg while skeletal stabilisation is placed).
12. Definitive repair or direct interposition grafts are preferred to bypass grafts.
13. Where cognition allows, patients must be made aware of the possibility of amputation. Any decision to perform early amputation must be made by two consultants and clearly documented.
14. Fasciotomies should always be considered. They should either be performed or the decision not to perform documented with the name of the senior decision maker. There is a low threshold for fasciotomy in these cases.
15. Post-operative care should be delivered in an appropriate area with nursing and medical staff competent in the assessment of the critically injured limb.

Evidence base
Studies with level-1 evidence are lacking. Predominantly retrospective series, with some good prospective studies, meta-analyses, reviews and expert opinion

* On 30th April 2021, the BOAST was updated to remove bullet point 11 that had appeared in the earlier version in error. We have preserved the numbering on all other bullet points for consistency with the previous version