

Executive summary

Rapid, accurate diagnosis and management of patients with injured extremities associated with tissue ischaemia is crucial for optimum outcome. Immediate referral and transfer to specialist centres, capable of handling vessel damage and complex fracture care is mandated. To achieve this, clear and consistent communication is required.

In the Northern Trauma network, arterial injuries associated with dislocation or fractures bypass Trauma Units (TU) to the Major Trauma Centres (Newcastle or Middlesbrough). Any patient that for some reason is not bypassed, will have an Emergency Department (ED) to ED transfer. At each MTC there is a single point of contact. At all times the patient and their injury components will be managed in accordance with [BOAST guidance](#):

Key Principles of Early Care regardless of presentation

1. Immediate Haemorrhage Control
 - Apply direct pressure as first-line intervention.
 - If bleeding persists, apply a tourniquet at the lowest possible level to achieve control. Avoid “high and tight” tourniquets unless absolutely necessary.
2. Management of Pulseless, Deformed Limb
 - Re-align the limb or reduce the dislocation promptly and apply a splint to maintain position where needed.
 - Repeat vascular examination after realignment:
 - Check for presence of palpable pulse and use a hand-held doppler for confirmation.
3. Timing of Vascular Assessment
 - Perform vascular checks:
 - At initial presentation
 - After any intervention (see above)

- Prior to leaving the ED for transfer to the operating theatre or another facility.
4. Do not delay transfer at a TU in order to acquire cross sectional imaging (this should be best done at the MTCs). If cross sectional imaging has already been done at time of diagnosis and prior referral, arrange immediate transfer of all available imaging to JCUH/RVI PACs.

These are just the basics of emergency care and should be innate and must happen in all cases of fracture or dislocation with an associated artery injury. The more important process step impacting on outcome is communication and this document is focussed on this.

Communication and coordination of patients

James Cook University Hospital, Middlesbrough (Darlington and North Tees)

Management of Complex Extremity Trauma with Vascular Injury Arriving Directly at James Cook University Hospital (JCUH)

1. Red Trauma Call Cases
 - All patients meeting red trauma call criteria will be received by a full trauma team, which will include the consultant vascular surgeon. The Consultant Vascular surgeon is therefore the main point of contact and early decision making for red trauma call cases having an extremity injury with arterial injury.
2. Non-Red Trauma Call Cases
 - For injuries not meeting red trauma call criteria, but where:
 - There is complex extremity trauma, and
 - Vascular injury is confirmed via:
 - Clinical examination (including hand-held Doppler), or
 - Cross-sectional imaging
 - This will trigger an emergency review (the ED Consultant in charge should ring to ensure review) by:
 - Consultant Vascular Surgeon (or resident registrar if unavailable or out of hours)

- Consultant in Trauma & Orthopaedics (or resident registrar if unavailable or out of hours)
 - Consultant Plastic Surgeon (if soft tissue coverage or nerve repair may be required – only to be called by the ED consultant if clear soft tissue loss or nerve injury).
3. Specialist Management Plan (from the Consultants in Orthopaedics and Vascular surgery +/- Plastic surgery)
- A documented, agreed specialist management plan must be available within 1 hour of the arrival of the patient in the ED.
4. Definitive Management
- Rapid transfer to the operating theatre should be planned to enable:
 - Early revascularisation
 - Bone stabilisation
 - Soft tissue coverage/nerve repair
 - This should occur once other emergency care elements are completed and handed over and the patient should be in the operating suite as soon as is possible and within 1.5 hours of arrival in the ED.

Protocol for Management of Complex Extremity Trauma with Vascular Injury presenting to Darlington Memorial Hospital or North Tees University Hospital and transferred to James Cook University Hospital, Middlesbrough.

1. Initial Identification

- Confirm complex extremity injury (bone, vascular, soft tissue) through:
 - Clinical examination (including presence of palpable pulses)
 - Hand-held Doppler (presence of signals)
 - Cross-sectional imaging (if already available)

2. Immediate Actions as per “Key Principles” above.

3. Escalation and Transfer

- Once diagnosis confirmed and early management completed with exigency:
 - Arrange urgent blue-light transfer to James Cook University Hospital (JCUH) ED.
 - Consultant ED (Darlington / North Tees) is to notify JCUH ED once patient has left the TU (one phone call to JCUH ED only) to allow cascade of clinical details(JCUH ED staff are to make the phone calls to):
 - Specialist registrar in Trauma & Orthopaedics

- Specialist registrar in Vascular Surgery
- Ensure any imaging is immediately transferred to JCUH PACs. Do not delay transfer to acquire cross sectional imaging locally.
- Escalate to consultants (Trauma & Orthopaedics and Vascular Surgery):
 - Prior to arrival if clinical picture dictates.
 - Or after initial assessment at JCUH by registrars.

4. Specialist Management Plan

- A documented, agreed plan must be available within 1 hour of arrival at JCUH ED.
- Transfer must not be delayed if specialist team members are occupied (e.g., in theatre) hence send and then ring.

5. Definitive Management

- Plan for rapid transfer to operating theatre for:
 - Early revascularisation
 - Bone stabilisation
 - Soft tissue coverage
 - Nerve repair
- Ensure other emergency care elements are completed and handed over.

Patients coming directly to Royal Victoria Hospital, Newcastle

Initial treatment in ED – as above Key Principles of Early Management.

Call Orthopaedic Surgeon on call

Call Vascular Surgeon on call

Call Plastic Surgeon on call for microvascular input as necessary

Plan for appropriate early surgery

Patients at Durham, Sunderland, Gateshead, Cumberland and NSECH Emergency Departments

TU ED senior decision maker to contact ED senior decision maker on call at RVI MTC via pre-alert phone (0191 2820311) and advise of impending transfer of patient, with concise history and timings of injury.

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