



Vascular Trauma

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| VERSION NUMBER/DATE | 1.0 / June 2017 |
| REVIEW DATE | 01/06/2019 |
| RELATED INFORMATION | North West London Trauma Network |

There are four hospitals within the network (James Cook University Hospital, Freeman Hospital, Cumberland Infirmary and Sunderland Royal Infirmary) that provide both an elective and emergency vascular service. There is no provision for vascular surgery on site at any of the other network hospitals, but haemorrhage control for patients in extremis should be able to be performed for damage control purposes at any Trauma Unit hospital prior to transfer if necessary.

Only one of the Major Trauma centres, JCUH, has vascular surgery on site. Newcastle upon Tyne NHS trust has two sites and the vascular service is situated at the Freeman Hospital. Therefore if a vascular patient is taken to the Royal Victoria Infirmary, early activation of the vascular team must be considered.

Vascular traumatic injury occurs most commonly as a result of blunt mechanism rather than penetrating in the UK. However, a blunt mechanism is more likely to be found at secondary survey with a risk of delayed diagnosis.

Examination

Assessment should be carried out according to ATLS principles and life threatening conditions should be managed. Vascular injuries may present with hard or soft signs.

| <u>Hard signs</u> | <u>Soft signs</u> |
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| Absent pulse | Haematoma -small |
| Bruit or thrill | History of hemorrhage at scene |
| Active hemorrhage | Unexplained hypotension |
| Haematoma –large/expanding | Peripheral nerve deficit, anatomically related |
| Distal ischemia +/- motor/sensory loss | Proximity of wound to vessel |
| | ABPI <0.9 or arterial pressure index <0.9 |
| | Dampened flow on Doppler examination |

Extensive soft tissue swelling may make evaluation difficult but a diminished or reduced distal pulse is due to arterial occlusion until proven otherwise. A concern raised of significant vascular injury from the mechanism, assessment or investigations should prompt contact with the on call vascular consultant via switchboard.

Investigations

CT angiography is used as the primary diagnostic study in major trauma patients with a suspected vascular injury

Plain images – useful for penetrating trauma including gunshot wound.

Types of Injuries

1. Isolated arterial injuries

Any patient with a traumatic arterial injury presenting at a network hospital without a vascular service should be discussed with the TTL at the MTC and transferred. Haemorrhage control should be provided by direct pressure +/- Celox, Field Dressing or tourniquet (time recorded) as appropriate and transferred via the ambulance service as an immediate priority transfer. If significant transfer time and during the day then it would be advisable to consider the Great North Air Ambulance Service.

If the on call MTC Vascular surgeon is contacted directly, any agreed transfer should be arranged as a trauma call following liaison with the TTL. If the TU has the available expertise, (in the absence of any other significant injuries), the patient may be managed locally.

Patients with such injuries presenting to a hospital with an on site vascular service should be assessed by the on call vascular surgeon as part of the Trauma call.

2. Polytrauma with a vascular injury

All such patients should be stabilised and transferred to the MTC as an immediate priority transfer.

3. Vascular patients at the MTC

Trauma patients with a known vascular injury should prompt the on call vascular SPR to be contacted to attend the trauma call. For Code Red patients with a suspected arterial/venous injury, the vascular consultant should be contacted to attend as soon as possible.

4. Extremity trauma

A full neurovascular assessment is needed. If tendon or nerve injuries are suspected, the plastic surgery consultant should be contacted prior to any exploration. Any hard sign of vascular compromise (absent distal pulse, expanding haematoma, pulsatile haemorrhage) mandates urgent exploration. Endovascular management is unlikely to be appropriate for the majority of these injuries and the best imaging modality is CT with arterial phase contrast rather than angiography which is unnecessary in most cases. Endovascular management should be considered for junctional injuries in sick polytrauma patients to restore flow and control haemorrhage as part of damage control resuscitation.

All penetrating and significant blunt (including fractures) limb injuries should have distal pulses examined and compared with the uninjured side. A Doppler signal is not the equivalent of a palpable pulse and if in doubt, a formal Doppler pressure should be

measured and compared with the normal side. In the absence of known PVD, there should not be >10% difference. If an injury is suspected, the area should be imaged by CTA.

In theatre, prosthetic material should be avoided where possible and when using autologous vein for bypass, this should be harvested from the contralateral limb in the presence of an ipsilateral major venous injury. Any anticipated delay to reconstruction should be managed by shunting and there should be a very low threshold for performing fasciotomies in the majority of cases.

The limb must be revascularised as a surgical emergency. Beyond 3-4 hours, warm ischaemia results in irreversible tissue damage and an increasing risk of amputation. Risks of delayed revascularisation include myoglobinuria and may be associated with increased mortality. Access incisions should be planned to facilitate subsequent soft tissue coverage of open fractures.

5. Cavity trauma

The vascular team should accompany the General Surgical team (or Code red surgeon when available) to theatre for any patient undergoing laparotomy for penetrating trauma where a significant arterial or venous injury is suspected and the theatre team should be informed that cell salvage will be needed. Unstable patients should go straight to the trauma theatre without imaging. A trauma laparotomy should be performed and haemorrhage control performed whilst the anaesthetic team catch up prior to definitive repair. All central retroperitoneal haematomas should be explored and the underlying vascular injury repaired.

Deceleration injuries and high velocity blunt trauma can lead to intimal disruption and occlusion of intra-abdominal vessels (eg. SMA) and there should be a high index of suspicion with appropriate scrutiny of the CTA.