Sultanate of Oman
Ministry of Health
Directorate General of Khoula Hospital
General Surgery Directorate

Institution Name: Directorate General of Khoula Hospital

Document Title: Guidelines for the Management of Vascular Injuries

Approval Process

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Location of original copy: General Surgery

Distribution to: Quality Management & Patient Safety Directorate & Khoula e-portal

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Content Table:

Acronyms:

Abbreviations	Full Term
%	Percentage
>	Greater than
A & E	Accident and Emergency
ABPI	Ankle brachial pressure index
API	Arterial pressure index
ATLS	Advance trauma life support
CT	Computerized tomography
e.g.	exempli gratia, is a Latin phrase and means " for example"
etc	et cetera a Latin expression meaning "and other things or "and so on"
HoD	Head of department
MoH	Ministry of Health
QM & PS	Quality Management and Patient Safety

Guidelines for the Management of Vascular Injuries

1. Introduction

Fewer than 10% of patients with polytrauma have associated vascular injuries but these can cause significant mortality and morbidity.

Vascular injuries may have ‘significant sequel, acute haemorrage may be overt, contained (e.g. muscle compartment) or concealed (e.g. pleural cavity). It may be immediate or delayed with re-bleeding. A contused artery may be initially patent but later thrombose and so ischemia may be acute or delayed. Control of haemorrage and restoration of perfusion are key to the resolution of vascular injury.

2. Scope

This Guidelines of Directorate General Khoula Hospital applies to multidisciplinary team involved in the management of vascular injuries.

3. Purpose

3.1 To provide guidance for health care professionals involved in the management of vascular injuries in Khoula hospital.

3.2 To provide direction and guidance for process of initial management of vascular injuries referred from other health care institutions.

3.3 To ensure that patients are transferred to the definitive point of care as quickly and safely as possible.

4. Definitions

4.1 **Vascular Injury:** Refers to injury to a blood vessel and artery, which carries blood to extremity or an organ, or a vein, which returns blood to the heart.

4.2 **Arterial pressure index (API):** is defined as the Doppler systolic arterial pressure distal to the site of injury divided by the doppler systolic arterial pressure measured at the same point in the uninjured extremity.

4.3 **Ankle brachial pressure index (ABPI):** An ABPI or API >0.9 indicates a very low risk of a significant arterial injury. The ABPI or API are less reliable in older patients due to concomitant peripheral arterial disease

5. Policy

It is the policy of the Directorate General of Khoula Hospital to ensure that all health care professionals strictly follow the policy and procedure:

5.1 Not all patients with vascular injuries will require transfer to Khoula Hospital. Examples would include dislocations with vascular compromise where relocation restores normal blood flow.

5.2 Some patients may be too unstable for transfer and will require direct damage control surgery within the peripheral / other hospitals.

5.3 Advice can be sought at any time from the Khoula Hospital vascular consultant on-call.

5.4 Emergency transfers to the Major Trauma Centre should follow the standard pathway:

5.4.1 Stabilize, arrange immediate transfer and inform consultant vascular surgery on-call.

5.4.2 When time permits contact relevant specialties.

5.5 The vascular trauma surgeon is the first point of call for all vascular trauma advice.

5.6 Between 07.30hrs - 14.30hrs, the case should be discussed with the Consultant Vascular Trauma Surgeon on call at Khoula Hospital.

5.7 After 14:30hrs the case should be discussed with the second on call/ trauma leader on call who will communicate with the Consultant Vascular Trauma Surgeon on call.

5.8 Refer to algorithm appendix 3

6. Procedure

6.1 Initial Assessment:

6.1.1 Patients should be assessed by the trauma team as per ATLS guidelines[1].

6.1.2 Patients with suspected arterial injury need to be discussed with the on call vascular surgeon at an early stage.

6.1.3 Mechanism of injury, Time of injury, Amount of blood loss and hemodynamic status of the patient are useful information to obtain from the pre-hospital team/ peripheral and other referring Hospitals.

6.1.4 Patients with penetrating injury must be log rolled to identify all sites of injury. Beware of missing wounds within skin creases especially axilla and perineum.

6.1.5 Active bleeding from wounds should be controlled with direct pressure (bandage etc.).

6.1.6 Vascular and neurological examination of the limb should be undertaken. If there is concern regarding a vascular injury pressure measurement should be taken: an ankle brachial pressure index (ABPI, lower limb only) or an arterial pressure index (API, upper or lower limbs).

6.2 **Management:**

6.2.1 Patients with limb ischemia secondary to displaced, angulated long bone fractures and / or joint dislocations e.g. knee or ankle dislocation, mid shaft femoral or supracondylar humeral fracture, should have the injury realigned or relocated as quickly as possible. This will require appropriate analgesia with neurological and vascular examination documented both before and after any manipulation.

6.2.2 Patients with hard signs of vascular injury (Table 1) require urgent operative intervention [2, 3]. Those with exsanguinating active bleeding and / or rapidly expanding hematoma require immediate operative intervention for haemorrhage control.

6.2.3 Even in the presence of hard signs, preoperative imaging may help guide surgical decision making and may be performed if the patient's hemodynamic condition allows. Such situations include:

A. When difficult to determine precise site of injury e.g. skeletal injury especially the mangled limb, long wound tracts parallel to course of vessel or multiple pellets from shot gun wounds.
B. Patients with preexisting peripheral arterial disease.
C. Clinical concern that hard signs may be due to extensive bone & soft tissue injury without actual vascular injury.
D. Planning approach to thoracic outlet injuries.

6.2.4 Patients with soft signs of vascular injury (Table 2) require further assessment with a low threshold for imaging [3].

6.2.5 Those with penetrating injury have 3-25% chance of significant injury. A CT angiogram is likely to be first line investigation but artifact from retained foreign bodies may necessitate intraarterial angiography.

6.2.6 Patients with a normal vascular and neurological examination with an ABPI or API >0.9 are extremely unlikely to have a significant arterial injury and do not usually require further vascular investigation. Patients following knee dislocation with normal ankle pulses and ABPI or API >0.9 do not usually need further imaging[2]. However, the requirement for imaging following knee dislocation is debated and the case for imaging should be considered on a case by case basis.

6.3 **Operative Management:**

6.3.1 Small Intimal defects will heal without complication in about 90% of patients. The risks and benefits of antiplatelet or anticoagulant agents needs to be balanced against the risk of bleeding (e.g. head and / or solid organ injuries) on a case by base basis[2].

6.3.2 Extravasation, pseudoaneurysm, occlusion or arteriovenous fistula of major "named" arteries within the upper limb and thigh (common femoral, superficial femoral and popliteal artery but not the profunda femoris artery) should usually be managed by open surgery[2].

6.3.3 Temporary intravascular shunts are an excellent damage control solution to arterial and large vein injury. No heparinization required as the patient is usually coagulopathic. Carotid shunts, IV tubing or chest drains can be utilized depending on vessel size. Consider performing a fasciotomy prior to vascular repair[4].

6.3.4 In patients without progressive shock, the presence of extravasation, pseudoaneurysm, occlusion or arteriovenous fistula within the profunda femoris artery or crural (posterior tibial, anterior tibial and peroneal) arteries may be amenable to observation (if artery occluded) or endovascular embolization (extravasation, pseudoaneurysm, or arteriovenous fistula)[2].

7. Responsibilities

7.1 Accident & Emergency (A&E) physician shall:

7.1.1 Ensure initial assessment of patients according to ATLS guidelines.

7.1.2 Early involve general surgery on call in the management of polytrauma/vascular injury patients.

7.2 Surgeon on call shall:

7.2.1 Respond as early as possible to calls from Accident & Emergency regarding polytrauma/vascular trauma patients.

7.2.2 Receive and respond to calls from other health care institutions regarding polytrauma/vascular trauma patients.

7.2.3 Ensure assessment of patients according to ATLS guidelines.

7.2.4 Notify early vascular surgery consultant on call and get management advice.

8. Document History And Version Control:

Document History and Version Control			
Version	**Description of Amendment**	**Author**	**Review Date**
01	Initial Release	Dr. Yasser Abbas	01/08/2018
02			
03			
04			
05			
Written by	**Reviewed by**	**Approved by**	
Dr. Yassir	See page # 2	Dr. Ali Al Mashani	

9. Attachments:

9.1 Appendix 1:

9.1.1 Table 1: Hard signs of Vascular Injury

9.1.2 Table 2: Soft signs of Vascular Injury

9.2 Appendix 2:

9.2.1 Algorithm for management of peripheral arterial injury

10. References:

Title of book/ journal/ articles/ Website	Author	Year of publication	Page
ATLS		9th Edition	
Evaluation and Management of Peripheral Vascular Injury. Part 1.	Western Trauma Association/Critical Decisions in Trauma.	Feliciano. D et al. J Trauma. 2011;70: 1551–1556.	
Evaluation and management of penetrating lower extremity arterial trauma	An Eastern Association for the Surgery of Trauma practice management guideline.	Fox. N et al. J Trauma Acute Care Surg. 2012;73: S315- S320	
Western Trauma Association Critical Decisions in Trauma: Evaluation and management of peripheral vascular injury, Part II	Feliciano. D et al. J Trauma Acute Care Surg	2013;75: 391-397.	

Appendix 1

TABLE 1: Hard signs of Vascular Injury

Hard signs of Vascular Injury	- Active pulsatile bleeding - Shock with ongoing bleeding - Absent distal pulses - Signs and symptoms of acute ischemia - Expanding hematoma - Thrill or Bruit

TABLE 2: Soft signs of Vascular Injury

Soft signs of Vascular Injury	- History of arterial bleeding at the scene (no ongoing bleeding) - Small, non-expanding, non-pulsatile hematoma - Shock with no other injury (suggesting large volume blood loss) - Weak pulse - Injury to anatomically related nerve - Proximity of wound to vessel - Ankle brachial pressure index <0.9 or arterial pressure index <0.9

Appendix 2

Figure 1: Algorithm for management of peripheral arterial injury