

Suggestions for Management of Peripheral Arterial Trauma

Askin Ender Topal*

Cardiovascular Surgery, Dicle University Medicine Faculty, Turkey

Peripheral arterial injury is most prevalent in cases of penetrating trauma mostly due to knife wounds or low-velocity handgun injuries, unlike the military experience. The most common affected arteries are the femoral or popliteal arteries and the brachial artery (50% to 60% and 30%, respectively). Blunt injuries account for 6-10% of vascular trauma and are often associated with musculoskeletal injuries and neural injuries [1].

The successful management of patients with arterial injuries aims to save both the patient's life and the extremity. Although the limb salvage rate is over 95% in cases of uncomplicated injuries; an associated skeletal injury may still result in amputation rates as high as 70%, especially in the lower extremity because of more tenuous vascular collaterals than the upper extremity [2]. Incidence of subclavian and axillary artery injury account for less than 9% of all vascular injuries with total mortality of up to 34.2 % and operation mortality of up to 14.8 % [3,4].

Restoration of blood flow should be completed within the critical ischemic time to optimize outcome (4 hours for proximal injuries and 12 hours for distal injuries in upper extremity, 6 hours in lower extremity). Patient with hard signs of vascular injury (active pulsatile hemorrhage, rapidly expanding hematoma, pulse deficit, palpable thrill/bruit) should proceed immediately to the operating room without any diagnostic procedure. Patients with soft signs (nonexpanding hematoma, history of significant bleeding, bony injury or proximity penetrating wound, neurologic deficit) should have further evaluation to rule out vascular injury whereas patients with normal physical examination findings and an ABI > 0.9 may be discharged. On the other hand, especially in axillary or subclavian artery trauma, a well-perfused limb does not necessarily preclude an arterial injury, because of an extensive network of collateral vessels in the shoulder girdle resulting with preserved distal pulses [5]. So I suggest imaging in the case of trauma close to axillary and/or subclavian artery despite ABI > 0.9.

General principles in the operating room are common, such as Fogarty catheters in the case of no run off blood flow, systemic heparinization if there is not a great deal of soft tissue, placement of a temporary vascular shunt in the case of delayed patients with complete interruption of distal perfusion, repair of associated venous injury if possible, preference of primary repair, preference of saphenous vein when primary repair is impossible, coverage of repaired vessels with soft tissue. But outcome may vary in different institutions. Limb loss following arterial injury has been variously ascribed to extent of tissue damage, associated nerve injury, associated bony fractures, duration of ischemia prior to revascularization, development of compartment syndrome, injury mechanism, anticoagulation and failed revascularization, most of which are unpreventable risk factors [6,7]. Unfortunately sometimes bad outcomes may be due to the surgeons' choices such as prophylactic fasciotomy, ligation of crural vessel, postoperative oral anticoagulant usage and amputation decision which are controversial issues.

In my previous study comprising of patients with lower extremity arterial trauma, as opposed to 6 of 108 (5.6%) without compartment syndrome, 25% (10 of 40) of patients with compartment syndrome lost the injured limb although therapeutic fasciotomy was performed (p=.002) [7]. So prevention of compartment syndrome is more significant on limb salvage. According to my experiences, I suggest to perform prophylactic fasciotomy to the patients with long ischemia

time and/or major soft tissue disruption in case of pulse deficit without fear of infection.

My another disapproval is ligation of crural arteries. It was shown that in atherosclerotic diseases ligation of crural vessels is safe as long as there is one remaining patent artery in continuity to the foot, provided that artery is not the peroneal artery. However in the case of vascular trauma, at least two crural arteries must be repaired for limb salvage, even there is very large segmental defect [7].

Post-repair administration of anticoagulant is not suggested according to oral anticoagulant guidelines. However my study, including patients with axillary and subclavian arterial trauma, demonstrated that the protective effect of anticoagulant agent against repair failure was significant according to the multivariate logistic regression analysis [8]. Except one case, all of 17 surgical interventions followed by anticoagulant administration were patent while seven repair failures occurred among 19 anticoagulation-free interventions. (p=.034) [8]. So I advise anticoagulation especially when prosthetic material is used; with the caveat in other injured tissue, especially with concurrent brain or spinal injury.

Lastly I want to advert about the amputation decision. The Mangled Extremity Severity Score (MESS) is an objective criterion for amputation prediction in case of vascular trauma. An MESS of 7 has been used as a cutoff point. Some injuries with high scores may well be salvageable by a diligent multidisciplinary team. In fact MESS score of higher than 7 does not mean that amputation is required, but MESS score of lower than 8 means that amputation is not required. So all arterial injuries should be repaired unless very great tissue damage which renders repair impossible.

References

1. Shalabi R, Amri YA, Khoujah E (2006) Vascular injuries of the upper extremity. *J Vasc Bras* 5: 271-276.
2. EAST Practice Management Guidelines Work Group: Practice management guidelines for penetrating trauma to the lower extremity.
3. Aksoy M, Tunca F, Yanar H, Guloglu R, Ertekin C, et al. (2005) Traumatic injuries to the subclavian and axillary arteries: a 13-year review. *Surg Today* 35: 561-565.
4. Demetriades D, Chahwan S, Gomez H, Peng R, Velmahos G, et al. (1999) Penetrating injuries to the subclavian and axillary vessels. *J Am Coll Surgeons* 188: 290-295.
5. Zarkadas PC, Throckmorton TW, Steinmann SP (2008) Neurovascular injuries in shoulder trauma. *Orthop Clin N Am* 39: 483-490.

*Corresponding author: Askin Ender Topal, Cardiovascular Surgery, Dicle University Medicine Faculty, Turkey, Tel: +90-412-2488001; E-mail: aendertopal61@hotmail.com

Received February 22, 2016; Accepted February 24, 2016; Published March 02, 2016

Citation: Topal AE (2016) Suggestions for Management of Peripheral Arterial Trauma. *Emergency Med* 6: e143. doi:10.4172/2165-7548.1000e143

Copyright: © 2016 Topal AE. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

-
6. Heis HA, Bani-Hani KE, Elheis MA (2008) Overview of extremity arterial trauma in Jordan. *Int Angiol* 27: 522-528.
 7. Topal AE, Eren MN, Celik Y (2010) Lower extremity arterial injuries over a six-year period: outcomes, risk factors and management. *Vasc Health Risk Manag* 6: 1103-1110.
 8. Topal AE, Eren MN (2011) c. *Minerva Chir* 66: 307-315.