

Consensus Statement on Decision Making in Junctional Trauma Care

P Parker on behalf of The Limb Trauma Working Group

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Abstract

Improvised explosive devices (IEDs) cause 60% of all UK fatalities in the current campaign in Afghanistan. Shorter evacuation timelines now deliver patients at the edge of the physiological envelope of survivability meaning that the available time period for haemorrhage control and initial wound surgery is short – often no more than 75 minutes. The concepts and practise of ‘right turn resuscitation’, damage control general and orthopaedic surgery, on-table ‘ITU’ pause/catch-up and then further resuscitative surgery are commonplace. In Helmand in 2011, multiple team operating is now the norm on these casualties with up to seven surgeons and three anaesthetists simultaneously involved in the operative care of one patient. This usually involves one consultant orthopaedic surgeon and trainee per lower limb, a plastic surgeon on the upper limb or face/eyes and two general surgeons obtaining proximal vascular control or in-cavity haemorrhage control. A combined meeting in 2010 of the Lower Limb and Torso Trauma Working Groups of the Academic Department of Military Surgery and Trauma produced 25 clear, didactic statements to provide advice to the consultant team. The fundamental message is that bleeding is always a surgical problem. Some adjuncts are available; pressure (direct and indirect), compressive bandaging, haemostatic dressings and tourniquets. However, only formal surgical control, by whatever means is definitive. Early proximal control is mandatory: in all cases, rapidly obtain the most distally appropriate proximal control above the zone of injury.

Introduction

Improvised explosive devices (IEDs) now cause approximately 60% of all UK fatalities in the current campaign in Afghanistan, and up to 13 June 2011 there had been 375 UK and 1661 US Afghanistan-related military fatalities [1]. Ministry of Defence figures also show that in the last ten years, over 1000 UK personnel have now returned wounded from overseas military duty, including 168 who have lost limbs, parts of limbs or eyes. The British Limbless Ex-Service Men’s Association reported that by late 2010, there had been 84 UK single limb amputees, 24 double and eight triple limb amputees [2]; limb amputation rates have markedly increased during recent military operations [3].

Management of these patients represents a significant challenge. Shorter evacuation timelines now deliver patients to Role 3 medical facilities at the edge of the physiological survivorship envelope meaning that the time available for haemorrhage control and initial wound surgery is short – often no more than 75 minutes. The concepts and practise of ‘right turn resuscitation’; damage control surgery/orthopaedics, on-table ‘ITU’ pause/catch-up and then further resuscitative surgery are commonplace. In Helmand in 2011, multiple team operating is now the norm on these casualties with up to seven surgeons and three anaesthetists simultaneously involved in the operative care of one patient. This usually involves one consultant orthopaedic surgeon and trainee per lower limb, a plastic surgeon on the upper limb or face/eyes and two general surgeons for proximal vascular control or in-cavity haemorrhage control.

The skills and the roles that each member has within the team must be learnt and rehearsed before deployment. The Military Operational Surgical Training (MOST) course, Hospital Exercise

(HOSPEX), overseas surgical training exercises, and our own institutional memory have major parts to play. However, as with previous consensus documents on amputation, fasciotomy and pain control, it remains useful to have more didactic published reference material. The following statements provide sound advice to the consultant team approaching their first tour or serve as a refresher to those returning. The fundamental message is that bleeding is always a surgical problem; adjuncts are available such as direct and indirect pressure, compressive bandaging, ‘haemostatic dressings’ and tourniquets. However, only formal surgical control, by what ever means (surgeons finger, soft clamp or tie) provides definitive haemorrhage control. The statements below comprise the unanimous thoughts of a combined meeting of the Limb Trauma Working Group and members of the Torso Trauma Working Group held at the Royal College of Defence Medicine in February 2010.

Consensus Statements

1. Bleeding is a surgical problem. Early proximal control is mandatory (Figure 1).
2. In all cases, obtain the most distally appropriate proximal control above the zone of injury.
3. Agonal, (arrest/peri-arrest) junctionally injured patients mandate ‘right turn’ resuscitation, immediate ABCDE assessment (consider immediate bilateral subclavian trauma lines) and immediate thoracotomy for intrathoracic aortic occlusion. A urinary balloon catheter may be placed in the right atrium and connected directly to the Level 1 infuser.
4. Clear and continuous dialogue must take place, at all times, between the surgical and anaesthetic teams.
5. If multiple surgeons are operating on one patient, one surgeon must be in overall charge. If there are multiple anaesthetists working on this patient, one must also be in overall charge. These two physicians together run the team; agree end-states and end-timings.

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Figure 1. A high left trans-femoral amputation. Note the proximal surgical control and the lack of bleeding.

6. Remove all CAT tourniquets in the emergency department (ED). If there is bleeding or concern over bleeding, immediately (pre-) apply a padded pneumatic tourniquet. If there is no bleeding, do not inflate the tourniquet. (Figures 2A and B). The implication is that ED must have its own pneumatic tourniquets ready for use.



Figure 2(A). The CAT tourniquet (with breakthrough bleeding onto the sheet) is replaced by (B) a pneumatic tourniquet (no active bleeding).

7. For debridement of bilateral below knee injuries/traumatic amputations, retain these loosely applied uninflated bilateral pneumatic tourniquets. Ensure the tourniquet is not occluding venous outflow from the limb.
8. Our consensus is to undertake rapid but accurate surgical debridement with an inflated tourniquet when possible; main vessels are identified and either tied off or temporarily controlled prior to release of the tourniquets.
9. Tourniquets may be placed over wounded proximal areas as a temporizing measure to obtain control of distal bleeding.
10. For IED/mine injuries higher than the knee, the most distal proximal control practical (above the haematoma/zone of injury) should be considered. Venous control is usually not necessary.
11. For IED/mine injuries higher than the knee; the minimal acceptable patient position is 'cruciform' on an active warming blanket, nipple to groin betadine prep and a Bair-Hugger® Patient-Warmer replaced on top of the torso.
12. Bilateral above knee amputations (AKAs) will usually mandate double groin control. Most distal proximal control sequencing in the lower limb junctional zone is; common femoral artery, external iliac artery, common iliac artery, aorta.
13. Uncontrollable buttock bleeding after packing may require intra-abdominal control.
14. Uncontrollable perineal bleeding after packing may require intra-abdominal control.
15. If pelvic bleeding is suspected, and a pelvic binder is in place, it must remain until proximal vascular control is obtained – Ensure the binder is placed correctly over the trochanters. If there is a pelvic fracture or ligamentous disruption, it will be seen on the initial film.
16. If the patient is stable – leave the binder on. Consider skeletal stabilization (external fixation or C-Clamp) for transport.
17. For pelvic injury – deal with the injuries you see. Mostly this will involve packing using a midline incision. Obtain the most appropriate proximal control you require, then 'Walk the Clamps' distally.
18. In pelvic trauma, consider urethral injury and place a suprapubic catheter.
19. In pelvic trauma, consider rectal injury and disconnect the colon – use an intestinal stapler to divide the colon and leave the ends inside the abdomen, formal colostomy is not necessary.
20. All viable gonadal tissue should be preserved - wherever possible. Do not over debride testicular tissue. Apply vaseline gauze and moist dressings only. Gonadal placement into a thigh pocket stretches the vas deferens, compresses the epididymis and expels potentially harvestable viable sperm. It is thus not recommended.
21. In upper limb junctional trauma, consider the intra-thoracic injury first.
22. Place patients in a crucifix position on a warming blanket and prep for a whole-chest thoracotomy. Place a Bair-Hugger over all uninjured extremities.
23. For axillary artery bleeding – obtain subclavian control.
24. For uncontrollable subclavian injury, apply direct pressure and perform a median sternotomy
25. For uncontrollable bleeding in the root of the neck, apply direct pressure and perform a median sternotomy.

Summary

The IED is the signature threat currently facing our deployed forces. A high trans-femoral amputee with mutilating perineal and significant pelvic injury is the signature injury pattern. A trained multidisciplinary team will produce the best results. Proximal control above the zone of injury is the key.

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References

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Lessons Learnt on Operation TELIC (Iraq) in 2003 *about* Wound and Fracture Care

Surgeons were not adequately trained to deal with the wounds of war. Amputations, proximal and junctional wounds, external fixation and wound debridements were not performed well. The adequacy of the initial debridement should always be paramount. If done badly, it will cost the patient their life or limb. Guillotine amputations were performed when more useful tissue could have been left for later reconstruction. Orthopaedic procedures that prevented early evacuation of the patient could have been avoided. All wounded patients should have received IV Benzylpenicillin 1.2g and Flucloxacillin 1.0g within one hour of wounding – they did not. These drugs should have given pre-hospital. Tetanus immunoglobulin administration was often forgotten.

Some 'modern advances' and techniques were inappropriately carried out. For some surgeons the presence of external fixation devices was an indication for their use - this was wholly incorrect. Femoral fractures should have been treated by Thomas splintage and not external fixation. When external fixators were applied for the correct reason - they were often applied badly. Inappropriate internal fixation (compression-plating) of contaminated military fractures took place within the battlespace (including on-board ships) with predictable infective results. Clinical governance was poor and documentation was at best only fair. There was little or no feedback from the UK regarding to patient outcomes.

Parker PJ, Adams SA, Williams D, Shepherd A. Forward surgery on Operation Telic – Iraq 2003. *J R Army Med Corps* 2005; 151(3): 186-91

Lessons Learned on Operation TELIC (Iraq) in 2003 *about* Training for War

Clinical: All surgery and anaesthesia in war-time must be Consultant-led. Junior trainees were used, inappropriately, to fill consultant slots in units. SHOs and Registrars should have been deployed in a supernumerary learning capacity only. All surgical staff should have recently attended the International Committee of the Red Cross War Surgery Course and Definitive Surgical Trauma Skills courses as well as the Military Mangled Extremity, Neurosurgery, Maxillofacial and Obstetric & Gynaecology courses within the preceding two or three years. Any deployed surgeon should have been previously actively involved in peacetime NHS trauma management.

Military: All medical staff should possess sufficient military field skills, not just to survive, but also to thrive, in the military environment. In addition all forward staff should be capable of digging in and living off their belt-kit for 48hours and still be able to perform good military surgery on-demand.

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