

BOA Elective Standard

The Safe Use of Intraoperative Tourniquets

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Background

Local tissue damage is a significant potential consequence of tourniquet use, particularly in vulnerable patients. All users should be aware of strategies for the prevention, diagnosis and management of tourniquet related injuries and that their early appreciation is imperative. This may be particularly challenging in patients undergoing regional anaesthesia and in patients unable to communicate adequately.

Inclusions:

All patients undergoing a procedure that involves application of a tourniquet.

Exclusions:

Trauma patients with pre-hospital tourniquet application for exsanguinating vascular injury

Standards

1. Tourniquets should only be used when clinically justified.
2. Details of the type of tourniquet should be recorded.
 - a. Only tourniquets approved by regulatory bodies should be used.
 - b. Tourniquet width should be more than half the limb diameter or contoured for patients with conical limbs.
 - c. Finger or toe tourniquets should be highly visible or applied using instruments included in the surgical instrument count so that they cannot be inadvertently retained.
3. The following details should be recorded in the operative record:
 - a. The condition of the tourniquet site prior to and at the end of the procedure.
 - b. The method of isolation used to exclude skin preparation fluids from seeping under the tourniquet.
 - c. The method of exsanguination:
 - i. Compressive exsanguination should not be used in the presence of infection, history of malignancy or risk of DVT.
 - d. The pressure and duration of tourniquet use:
 - i. A limb tourniquet with a timer alarm should be used.
 - ii. If a pneumatic tourniquet is utilised, a pressure gauge must be used.
 - iii. Tourniquets should be applied over a thin, even layer of padding.
 - iv. Patients <16 years should have a tourniquet pressure of limb occlusion pressure plus 50 mm Hgⁱ or systolic blood pressure plus 50-100 mmHg.
 - v. Patients >16 years should have a tourniquet pressure of systolic blood pressure plus 70-130 mmHg for the lower limb and 50 -100 mm Hg for the upper limb.^{ii iii}
 - vi. The ischaemic tourniquet time should ideally be less than 120^{iv} minutes and only extended beyond this after a clinical assessment of the relative risks and benefits, by the operating surgeon. Audible reminders must be given to the operating surgeon every 10 minutes beyond 120 minutes, and tourniquet use beyond 150 minutes is rarely justified.
4. If a tourniquet related burn is suspected in the operating theatre, the following steps must be taken at the conclusion of the procedure:
 - a. Detailed documentation of the site and dimension of the injury.
 - b. Documentation of skin preparation fluid including duration of contact.
 - c. Digital photography, uploaded to the patient record.
 - d. Discussion with a plastic surgical and/or tissue viability team.
5. If a tourniquet related burn is confirmed, an ongoing management plan should be documented. This must include shared decision making with a plastic surgical and/or tissue viability team.
6. If tourniquet related ischaemia and/or nerve damage are suspected refer to the condition specific BOAST.

References

- i. Lieberman JR, Staheli LT, Dales MC. Tourniquet pressures on pediatric patients: a clinical study. *Orthopedics* 1997;20:1143-7.
- ii. Margin calculated by Johnson 2021 using formulae from Tuncali B, Karci A, Tuncali BE, et al. A new method for estimating arterial occlusion pressure in optimizing pneumatic tourniquet inflation pressure. *Anesth Analg*. 2006;102(6):1752-1757.
- iii. Kasem SA, Bassiouny AAE, Rashwan DAE, Bahr MH. Minimal Inflation Tourniquet Pressure Using Induced Hypotension with Limb Occlusion Pressure Determination or Arterial Occlusion Pressure Estimation in Upper Limb Surgery: A Randomized Double-Blinded Comparative Study. *Anesth Pain Med*. 2020 Apr;10(2) e102124. doi:10.5812/aapm.102124. PMID: 32754434; PMCID: PMC7353217.
- iv. Kam PC, Kavanagh R, Yoong FF. The arterial tourniquet: pathophysiological consequences and anaesthetic implications. *Anaesthesia*. 2001 Jun;56(6):534-45. doi: 10.1046/j.1365-2044.2001.01982.x. Erratum in: *Anaesthesia* 2001 Aug;56(8):821. Kavanagh R [corrected to Kavanagh R]. PMID: 11412159.