Anesthesia for Trauma Patients
Agenda

- Contributors
- Purpose
- Summary
- Key Principles of CPG
- Performance Improvement (PI) Monitoring
- References
- List of Appendices in CPG
Contributors

- CDR Joshua Tobin, MC, USNR
- COL William Barras, AN, USA
- Capt Stephen Bree, MC, UK
- CAPT Necia Williams, MC, USN
- LtCol Craig McFarland, MC, USAR
- LtCol Claire Park, RAMC
- LtCol David Steinhiser, USAF, MC
- MAJ Craig Stone, MC, CF
- CAPT Zsolt Stockinger, MC, USN

Slides: Maj Andrew Hall, USAF, MC

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Purpose

This CPG provides evidence–based guidelines for providing anesthesia in military trauma patients in extremis.
Be prepared. Adjust induction and maintenance of anesthesia in critically ill and hemodynamically unstable patients.

Anesthesia providers are integral to the operative resuscitation and after-care of trauma patients.
Key Principles of CPG

- Pre-Induction
- Induction of Anesthesia
- Maintenance of Anesthesia
- Resuscitation
- Post-Operative/Emergence
- PI Monitoring
- References
- Appendices
Pre-Induction

- Avoid Hypothermia.
  - Warm OR to greater than 30°C.
  - Warmed intravenous (IV) line and rapid infuser with warming capability.
  - Forced air warmer.

- Prepare for massive transfusion with establishment of massive transfusion protocol and communication with blood bank.

- Have anesthesia present in the trauma bay to assist when needed and provide smooth transition to OR.

Anesthesia providing assistance in trauma bay with airway and oxygenation with eventual intubation.
Induction of Anesthesia (1)

- Ongoing volume resuscitation critical to avoid disastrous induction in an exsanguinating patient.

- Verify functioning vascular access and placement of monitoring devices prior to induction.
  - Do not delay induction for placement of central access or invasive monitoring.

- Pre-oxygenation with four full vital capacity breaths ideal prior to rapid sequence induction.
  - May not be possible in obtunded patient and may have to rely on apneic oxygenation.
Induction of Anesthesia (2)

- Adjust induction dosages of sedative hypnotics to balance induction with hemodynamic changes.
  - Ketamine (1 mg/kg) will not decrease systemic vascular resistance to the same extent as other sedative hypnotics.
  - Propofol can decrease systemic vascular resistance significantly; reduce doses (0.5-1 mg/kg) in hypotensive patients.

- Succinylcholine or Rocuronium used most common neuromuscular relaxation medications for rapid sequence induction.
  - Sufficient relaxation in 45 seconds with succinylcholine at 1 mg/kg.
  - Sufficient relaxation in 60 seconds with rocuronium at 1-1.2 mg/kg.
Prompt endotracheal intubation following induction mitigates risk of aspiration.

- Rapid sequence induction (RSI) with direct laryngoscopy is a safe and effective method to secure an airway.
- Prudent to minimize manipulation of the cervical spine to the extent possible.
Be prudent with a limited number of immediately available airway adjuncts nearby. Laryngoscopist must be familiar with adjuncts.

- Gum elastic bougie and video laryngoscopy are common adjuncts.
- Surgical airway equipment should always be available.

After intubation, verify end tidal carbon dioxide and communicate with surgeon.

- Placement of orogastric tube soon after intubation may decrease risk of aspiration.
Maintenance of anesthesia can be accomplished via inhalational volatile agent or total intravenous anesthetic (TIVA).

- Carefully titrate to hemodynamic profile while maintaining adequate sedation/hypnosis/analgesia.
- Awareness and pain response can be mitigating during TIVA by using both a sedative hypnotic and analgesic.

- Maintain adequate IV access and obtain arterial line if indicated.
Maintenance of Anesthesia

- Obtain baseline set of labs to include coagulation studies and base excess.
- Guide maintenance of anesthesia and resuscitation to a mean arterial pressure goal, generally MAP > 55 mm Hg.
  - Maintain systolic blood pressure > 90 mm Hg in patients with documented or suspect TBI.

TBI patient undergoing operation
Resuscitation

- Resuscitation guided by the *Damage Control Resuscitation CPG*
  - Ratios of FFP: PRBC approaching 1:1 have been demonstrated to confer a survival benefit in trauma patients.
  - Communicate progress of resuscitation with surgical team.

- Tranexamic acid dose of 1 g over 10 minutes within 3 hours of injury has demonstrated a survival benefit.
  - Initial dose followed by an infusion of 1 gm over 8 hours.
Resuscitation

- Vasopressors may be required in trauma, but are associated with higher mortality.
  - Vasopressin bolus 5-10 units followed by 0.04 U/min can be given in concert with aggressive blood product administration in refractory hypotension.
  - Hydrocortisone dose of 100 mg can improve vasopressor responsiveness in critically ill trauma patients.

- Timely administration of antibiotics can decrease post-operative infections and is part of anesthetic resuscitation.
  - See JTS Infection Prevention CPG for optimal antibiotics for given scenarios.
Low lung volume ventilation, 6 mL/kg, can decrease mortality in patients with acute respiratory distress syndrome (ARDS).

- Can improve outcomes in patients who have not developed ARDS.
- Consider using low lung volume ventilation in OR.

Communicate with next role of care to maintain continuity.

- Provide a detailed written report/anesthetic record including the operative resuscitation.
- Be immediately available in the post-operative period to answer any questions and clarify issues.
Intent (Expected Outcomes)

- Trauma patients in the OR will maintain a body temperature > 36°C.
- Anesthesia following major trauma will be induced and maintained with < 20% drop in initial blood pressure.
- Any incidence of awareness under anesthesia during TIVA or GETA will be documented.
- No trauma patient will experience a sustained MAP < 50 mmHg during maintenance of anesthesia.
- Patients undergoing massive transfusion will receive blood products in a PRBC: FFP: Platelet ratio approaching 1:1:1.
- Calcium chloride will be administered to hypotensive patients who have received more than 4 units of PRBC.
- Antibiotics will be administered to all patients within 30 minutes of incision.
- Anesthesia record will reflect an accurate description of the resuscitation undertaken in OR.

Data Source

- Patient Record
- Department of Defense Trauma Registry (DoDTR)
Performance/Adherence Measures

- Trauma patients in the OR maintained a body temperature > 36°C.
- Anesthesia following major trauma will be induced and maintained with < 20% drop in initial blood pressure.
- Any incidence of awareness under anesthesia during TIVA or GETA was documented.
- Patients undergoing massive transfusion received blood products in a PRBC: FFP: Platelet ratio approaching 1:1:1.
- Calcium chloride was administered to hypotensive patients who received more than 4 units of PRBC.
- Antibiotics were administered to all patients within 30 minutes of incision.
References

References


Appendices

- Appendix A: Trauma Anesthesia Checklist
- Appendix B: Additional Information Regarding Off-Label Uses in CPGs