

An introduction to induction agents in major trauma

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Case overview:

A 46-year-old male patient presented to the Emergency Department with thoracic stab wounds. His bedside echo was negative for tamponade. He was agitated and hypotensive, in presumed hypovolaemic shock.

What happened next?

He was rapidly transferred to the operating table where anaesthesia was induced using fentanyl, ketamine and rocuronium. Cardiovascular collapse ensued. The team later discussed the choice of anaesthetic agents and their doses.

Key insights:

- Averting cardiovascular collapse in some injury patterns (e.g. tamponade and near exsanguination) may not be possible but every effort should be made to avoid this.
- Consider the potential causes and severity of shock when choosing agents and doses.
- In critically unwell patients, surgeons should be scrubbed and prepared for immediate intervention.
- Peri-intubation cardiovascular collapse is often multifactorial- address causes of shock proactively- e.g. plan for pneumothorax decompression. Is tamponade present or possible? Make blood products immediately available for volume expansion.
- Vasopressor administration is rarely the solution to peri-induction instability in the shocked trauma patient.
- Anaesthetic awareness is extremely unlikely

RLH Suggested Agents and Doses- use clinical judgement

Stable Trauma Patients:

fentanyl (1 µg/kg) + ketamine (1 mg/kg) + roc (1 mg/kg)

Shocked Trauma Patients:

Omit fentanyl to avoid exacerbating hypotension:
ketamine (0.5-1 mg/kg) + rocuronium (1-2 mg/kg)

Exsanguination with Low Consciousness State:

Consider further reductions of induction agents or complete omission (rocuronium-only intubation).

Inducing anaesthesia- some challenges:

1 Acidaemia and shock

Severe acidosis causes negative inotropy
Altered tissue perfusion and reduced cardiac output
Unpredictable drug effects inc. delay in onset

2 Ongoing haemorrhage

Volume status may change rapidly- reassess
Ongoing volume expansion (blood) required
Haemorrhage leads to smaller volume of distribution
Unpredictable drug effects inc. exaggerated physiological response

3 Reliance on sympathetic drive

Sympatholytic drugs may cause cardiovascular collapse

4 Apnoea on induction

Loss of respiratory compensation for metabolic acidosis
Worsening acidaemia (see 1)

5 Positive pressure ventilation

Tension pneumothoraces cause obstructive shock
Positive intrathoracic pressure can reduce preload
Reduced cardiac output

6 Cardiac Irritability

Direct injury and or reduced coronary perfusion are
pro-arrhythmic

7 Human Factors

Unfamiliar & environment, time pressure, etc
Ensure senior members of the trauma team are involved

Agent-specific considerations:

Propofol	Vasodilation causes hypotension that does not recover with volume resuscitation.
Ketamine	Used for its relative cardiovascular stability and longer duration of effect. Use in TBI is not contraindicated.
Fentanyl	Sympatholytic properties - avoid in shocked patients until haemorrhage is controlled.
Rocuronium	Shocked patients may require higher doses to compensate for prolonged onset times.

