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Peri-Operative Anaesthetic Challenges in a 16-Year-Old with Multiple Thoracic Vertebral Burst Fractures Following Road Traffic Accident

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Abstract: ***Background**: Thoracic burst fractures following high-velocity road traffic accidents present unique perioperative challenges because of the risk of neurological deterioration, major blood loss, difficult positioning, haemodynamic instability, and prolonged surgery. Anaesthetic management requires meticulous planning to preserve spinal cord perfusion while ensuring adequate oxygenation and haemodynamic stability. **Case Report**: A 16-year-old female sustained multiple thoracic spine fractures following a road traffic accident while travelling as a pillion rider. MRI demonstrated an anterior wedge compression fracture of T5 with 46% vertebral height loss, burst fractures of T6 and T8, retropulsion of T6 fragments causing spinal canal stenosis, and marrow oedema involving T5, T6 and T8. CT brain showed no intracranial injury. FAST examination was negative, and echocardiography demonstrated normal ventricular function (LVEF 60%). She underwent posterior thoracic spinal decompression and stabilization under general anaesthesia. Anaesthesia was maintained with oxygen–nitrous oxide–isoflurane, fentanyl infusion and vecuronium infusion. Approximately 750 mL blood loss occurred during the 6-hour surgery and was managed with crystalloids, blood transfusion and vasopressor support. The patient was extubated successfully and transferred to the intensive care unit without neurological deterioration. **Conclusion**: Successful perioperative management of thoracic burst fractures requires careful airway management, maintenance of spinal cord perfusion, anticipation of blood loss, multidisciplinary planning and vigilant postoperative monitoring.*

Keywords: Thoracic burst fracture, spinal trauma, paediatric anaesthesia, polytrauma, spinal decompression, posterior stabilization

1. Introduction

Thoracic burst fractures account for a significant proportion of high-energy spinal injuries. Retropulsion of fracture fragments into the spinal canal increases the risk of neurological injury. Posterior decompression with instrumentation is associated with prolonged operative time, major blood loss, prone positioning, and haemodynamic fluctuations, making anaesthetic management particularly challenging.

This report describes the successful perioperative management of an adolescent with multiple thoracic burst fractures undergoing posterior spinal decompression and stabilization.

2. Case Presentation

A 16-year-old female patient was admitted following a road traffic accident while travelling as a pillion rider. She presented with severe upper back pain, left shoulder pain, and multiple facial injuries. There was no history of loss of consciousness, seizures, or vomiting.

On examination, she was conscious, alert, and oriented with a Glasgow Coma Scale (GCS) score of 15/15. Motor power was 5/5 in all four limbs, and there were no focal neurological deficits. Airway assessment was unremarkable. Physical examination revealed left periorbital swelling, blood-stained discharge from the left ear, multiple facial lacerations and abrasions, along with abrasions over the anterior chest wall and extremities.

On admission, her vital signs were stable: blood pressure was 140/90 mmHg, heart rate was 116 beats/min, and oxygen saturation was 98% on Room Air.

Magnetic resonance imaging (MRI) of the Whole Spine revealed an anterior wedge compression fracture of the T5 vertebral body with a 46% reduction in vertebral body height, burst fractures of T6 and T8, retropulsion of T6 fracture fragments causing spinal canal stenosis, and bone marrow oedema involving the T5, T6, and T8 vertebrae. Computed tomography (CT) of the brain showed no evidence of intracranial haemorrhage, skull fracture, or midline shift. Extended Focused Assessment with Sonography for Trauma (e-FAST) was negative for intra-abdominal injury. Electrocardiography demonstrated T-wave inversions in leads V1–V4; however, serum troponin levels and two-dimensional echocardiography were normal, with a left ventricular ejection fraction of 60% and no regional wall motion abnormalities, excluding significant blunt cardiac injury.

The patient was classified as American Society of Anesthesiologists (ASA) Physical Status III. The anticipated anaesthetic challenges included thoracic spinal instability, risk of neurological deterioration during positioning, prolonged surgery in the prone position, significant intraoperative blood loss, and the possibility of postoperative

ventilatory support. Adequate blood products were cross-matched and kept ready before surgery.

3. Intra- Operative Course

After confirming the patient's identity and completing the immediate pre-anaesthetic evaluation, standard ASA monitors were attached. Anaesthesia was administered through two peripheral intravenous lines (18G in the left hand and 20G in the right hand). Premedication consisted of intra-venous (iv) glycopyrrolate 0.2 mg, midazolam 1 mg, morphine 3 mg and lignocaine 3 mL. Following pre-oxygenation with 100% oxygen for 3 minutes, patient was induced using intravenous propofol 100 mg, and neuromuscular blockade was achieved with vecuronium 6 mg iv.

The trachea was intubated under direct laryngoscopy with a 7.0-mm flexometallic endotracheal tube, secured at 20 cm at the right angle of the mouth after confirming bilateral equal air entry. Patient was maintained on O2, N2O and isoflurane (0.2–1%) along with continuous fentanyl and vecuronium infusion (20 µg fentanyl and 2 mg vecuronium at 4 mL/h), which was gradually tapered and discontinued towards the end of the procedure.

Intraoperatively, the patient received intravenous ephedrine 6 mg for haemodynamic support, dexamethasone 8 mg iv, hydrocortisone 100 mg iv, methylprednisolone 500 mg iv, paracetamol 1 g iv, tranexamic acid 500 mg iv, ceftriaxone 1 g iv and metronidazole 500 mg iv.

Throughout the procedure, haemodynamic parameters remained stable, with systolic blood pressure ranging from 88 to 118 mmHg and diastolic blood pressure from 58 to 84 mmHg. Heart rate remained between 64 and 92 beats/min, oxygen saturation was maintained at 98-99%, end-tidal carbon dioxide between 30 and 35 mmHg, respiratory rate between 12 and 14 breaths/min, and the patient remained afebrile.

Fluid management included administration of 500 mL each of normal saline, Ringer's lactate, dextrose normal saline, and an additional 500 mL of normal saline. Estimated intraoperative blood loss was approximately 750 mL, while urine output was 600 mL intraoperatively (700 mL total). No critical intraoperative events or anaesthesia-related complications were encountered.

At the completion of surgery, spontaneous respiration resumed, and the patient was responsive to verbal commands. After thorough oropharyngeal suctioning, neuromuscular blockade was reversed with intravenous neostigmine 2.5 mg and glycopyrrolate 0.5 mg. Following confirmation of adequate recovery, including a sustained head lift for more than 5 seconds, the trachea was extubated uneventfully. The patient remained haemodynamically stable and was transferred to the recovery room for further postoperative monitoring.

Postoperatively, the patient was shifted to the Medical Intensive Care Unit (MICU) for close observation. Management included supplemental oxygen therapy, packed red blood cell transfusion, intravenous fluid administration, multimodal analgesia, continuous neurological and haemodynamic monitoring, and serial assessment of haemoglobin and serum electrolytes. The postoperative course was uneventful, with no neurological deterioration or respiratory complications.

4. Discussion

This case highlights several important anaesthetic considerations.

1) Spinal cord protection Maintaining adequate mean arterial pressure is essential to preserve spinal cord perfusion.
2) Airway management Minimal cervical and thoracic movement should be ensured during intubation.
3) Blood loss Posterior spinal fixation frequently causes significant blood loss. Tranexamic acid and appropriate transfusion strategies improve perioperative outcomes.
4) Prone positioning Meticulous padding is essential to prevent pressure injuries, ocular complications and venous congestion.
5) Multidisciplinary care Successful outcome required close coordination among trauma surgeons, neurosurgeons, anaesthesiologists, paediatricians, cardiologists and intensivists.

Anaesthetic Challenges

Thoracic burst fractures require meticulous preoperative neurological assessment.

Maintenance of spinal cord perfusion is a major anaesthetic goal.

Anticipation of blood loss and prolonged surgery improves preparedness.

Careful positioning prevents secondary neurological injury.

Early ICU monitoring facilitates prompt recognition of complications.

5. Conclusion

The successful management of thoracic burst fractures relies on meticulous anaesthetic planning, vigilant intraoperative haemodynamic management, blood conservation strategies, and coordinated multidisciplinary care. Early surgical stabilization with appropriate perioperative management can lead to favourable neurological and functional outcomes, even in complex adolescent polytrauma patients.

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