Penetrating abdominal injury in a polytrauma patient: Anaesthetic challenges faced

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Penetrating abdominal injuries are potentially life threatening due to the associated hemorrhagic shock and visceral injury. Through and through penetrating injury with polytrauma is rarely encountered. We report a case presenting with in situ projecting heavy metallic rod in a through and through penetrating abdominal injury along with foreign body in a road traffic accident. Anaesthetic management was difficult due to inability to position in supine, rapidly progressing hemorrhagic shock and hypoxia due hemopneumothorax. Two operating tables were used with adequate intervening space to accommodate the posteriorly projecting metallic rod during intubation in supine position. Intensive monitoring and resuscitation resulted in uneventful successful outcome.

Key words: Operating table, positioning, polytrauma, penetrating abdominal injury, shock

Abstract

Penetrating abdominal injuries are potentially life threatening due to the associated hemorrhagic shock and visceral injury. Through and through penetrating injury with polytrauma is rarely encountered. We report a case presenting with in situ projecting heavy metallic rod in a through and through penetrating abdominal injury along with foreign body in a road traffic accident. Anaesthetic management was difficult due to inability to position in supine, rapidly progressing hemorrhagic shock and hypoxia due hemopneumothorax. Two operating tables were used with adequate intervening space to accommodate the posteriorly projecting metallic rod during intubation in supine position. Intensive monitoring and resuscitation resulted in uneventful successful outcome.

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Introduction

Abdomen is the third most commonly injured region of the body, involving 20% of all injured civilians who undergo surgical intervention.[1] Penetrating wounds represent 25% of all urban traumas which include gunshot, shotgun and stab wounds.[1] These injuries are potentially life threatening and often warrant exploration.

Penetrating wounds presenting with in situ objects are rarely encountered, and anaesthetic and surgical management is complex due to inability in positioning the patient and the risk of sudden hemorrhage. The anaesthetic management of these types of injuries is challenging with respect to airway control, urgency for the surgery and associated hemodynamic instability.[2]

Case Report

A 50-year-old male patient was brought to the emergency medicine department (EMD) with an in situ 2.8' heavy metallic bar projecting over the back in a through and through penetrating abdomen injury following road traffic accident (RTA). The entry and exit wounds were in the back in the midline at L₃ level and right iliac fossa, respectively [Figures 1 and 2]. The penetrating heavy metallic bar had to be cut from the three wheeler vehicle prior to transporting the patient to hospital.

The patient presented with acute dyspnea, cough and abdominal pain. He was in hypovolemic shock with blood pressure 76/30 mm of Hg and pulse rate 140/minute and with cold extremities. He had consumed alcohol and was full-stomach. Auscultation revealed decreased air entry in the right thorax with oxygen saturation on room air of 80%. Oxygen supplementation (8 L/minute) with face mask and intravenous fluids were started. Abdomen displayed an iron bar which had entered through the back, and at its tip, another foreign body (nylon bag!) was visible through an open anterior abdominal
wall wound [Figures 1-3]. Ultrasound examination in the EMD revealed hemoperitoneum with penetrating foreign bodies. The patient was extremely restless. Portable emergency room chest radiograph revealed right-sided pneumothorax. Intercostal drainage (ICD) was planned but insertion was difficult owing to difficulty in positioning the restless patient. The patient was rushed immediately to operating room (OR) in a lateral position. He was positioned supine over two operating tables arranged in parallel [Figure 4], such that the metallic rod was positioned in between them. ICD was placed in the right 4th intercostal space and simultaneously anaesthesia was induced with intravenous ketamine 100 mg. Succinylcholine 75 mg i.v. was administered and modified rapid sequence tracheal intubation was performed. Anaesthesia was maintained with 50% air-oxygen mixture, fentanyl 2 mcg/kg, sevoflurane and vecuronium. Volume replacement with colloids and crystalloids along with dopamine 5-8 mcg/kg/minute were needed to maintain intraoperative blood pressures. A central venous catheter was placed in the right subclavian vein and central venous pressure (CVP) was monitored. Two and a half liters of crystalloids, 2 units of plasma and 4 units of whole blood were replaced. The patient was repositioned semi-laterally so as to visualize both ends of the foreign body which was then accessed and removed by anterolateral laparotomy approach. Laparotomy revealed retroperitoneal haematoma, lower renal pole injury, multiple mesenteric vascular tears and bowel injury. L3 vertebra spinous process fracture and pubic ramus fracture were also detected. The patient had 250 mL urine output during surgery. Postoperatively, the patient was mechanically ventilated for 8 hours and trachea was extubated, once hemodynamically stable. The patient was discharged from the hospital on the 10th day.

**Discussion**

Although penetrating injuries of abdomen are common, presentation with projecting *in-situ* foreign bodies is rare.[3,4] Various types of Objects causing such injury include glass, knife, barbed wire, bearing scrapper, plank, forklift, broomstick and metal hooks.[3] Survival following a through and through penetrating thoraco-abdominal injury with a large heavy iron
rod is rare and rarer still when associated with polytrauma. Difficulties in managing such a patient are manifold due to hypoxia, hemorrhagic shock, urgency of surgical intervention and inability to position the patient supine.

Airway control may be challenging if the projecting object in the back precludes supine positioning and any inadvertent manipulation can result in sudden collapse of the patient. Resuscitation and close monitoring prior to and during surgery, especially at the time of removal of penetrating object, is vital with anticipation of major vascular injuries. There was delay in reaching the hospital as the penetrated metallic rod had to be cut from the vehicle.

Progressive dyspnea, due to chest injury with fracture ribs mandated emergency ICD insertion to relieve hemopneumothorax. However, ICD insertion was not possible in the EMD as the intoxicated, full stomach patient, with worsening hypoxia and hypotension was getting progressively restless. CVP measurement and stomach tube insertion (to empty the gastric contents), though ideally required prior to anaesthetic administration, were not possible due to the above reasons. Induction of anaesthesia in the EMD was required, but inability to position the patient supine was a major hurdle.

Positioning to administer anaesthesia was difficult. Tracheal intubation with the patient in lateral position was not practical as the long metal bar was projecting and there was associated chest injury and pelvic fracture. To position the patient supine without disturbing the projecting metal rod on the back, a “two-table technique” was used. Two parallel tables were arranged and patient was positioned in such a way that the projecting rod takes the space between the two. Endotracheal intubation fortunately could be performed without difficulty. This “two-table technique” is a safe and simple solution for this life-threatening situation with projecting objects over back of chest and abdomen.

During the removal of foreign body, anticipation of sudden gushing out of blood from an injured major vessel is essential. Surgical removal of the foreign body may relieve the plugging effect of the foreign body on the breach in the injured blood vessel wall. Fortuitously, our patient did not have any injury to the inferior vena cava or aorta although such association is well known. Continued hypotension may indicate bleeding elsewhere and our patient also had an associated pelvic fracture with hematoma.

Hypovolemia was partly corrected in EMD. Modified rapid sequence induction-intubation with ketamine in this circumstance may be the choice. Emergently placed ICD relieved the pneumothorax, improved the blood pressure and saturation. Right side was preferred for subclavian central venous catheter as ICD tube was already in place for the pneumothorax. Dopamine infusion was started along with volume replacement to maintain adequate blood pressure and organ perfusion. Autologous blood transfusion was not considered as the penetrated object was contaminated. Required volume replacement was done with blood, blood products and crystalloids transfusion. Advanced trauma life support (ATLS) curriculum advocates rapid infusion of up to 2 L of warmed isotonic crystalloid solution for any hypovolemic, hypothermic patient to restore normal BP and urine output. 100% oxygen was used as the patient was in shock and had pneumothorax.

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