



PENETRATING CHEST TRAUMA WITH ROD INSITU – A CASE OF DIFFICULT VENTILATION AND INTUBATION.

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ABSTRACT

Chest wall trauma accounts for 25% of all deaths from traumatic injury. Penetrating traumas are life-threatening depending on the mechanism of the injury. The next line of management is based on the presentation and aetiology of the penetrating trauma. Traditionally, the "danger zone" has been described as the region between the epigastrium and the sternal notch and laterally within 3 cm of the sternum. This case report presents a 33-year-old female who was brought to the trauma ward after fall of iron rod from a height and impacting on the right side of the chest, penetrating through and through. Entry was from the level of the 2nd rib posteriorly on the right side and anteriorly at the level of the 4th intercostal space (1.5 cm from the mid-clavicular line), she was planned for the emergency thoracotomy with the limited resources available. The anaesthesia plan for this case was decided as general anaesthesia with an ET tube in lateral position, as the supine position was impossible for this case due to the placement of the rod. **Summary-** Intubation in lateral decubitus is better in these situations. SLT can be used successfully in case of emergency for lung isolation.

KEYWORDS : penetrating trauma, chest trauma, intubation in a lateral position, rod penetrating the chest.

INTRODUCTION –

The thoracic cavity contains three major systems, i.e., the airway, the lungs, the heart, and the great vessels. Trauma to the thoracic cavity may be life-threatening due to injury to one of these contents. The "danger zone" has been described as the region between the epigastrium and the sternal notch, and laterally within 3 cm of the sternum¹.

Morbidity and mortality are increased with thoracic trauma as it interferes with the circulation, breathing, or both. Respiration interference may be due to damage to the lungs, trachea, or tracheobronchial tree. Circulation is impaired due to cardiac injury, injury to great vessels leading to bleeding, and decreased venous return. These are time-sensitive and life-threatening injuries. Penetrating injuries may vary in presentation based on the direction of the penetrating object, and accordingly, an investigations and operative interventions are decided. Few patients may not manifest the underlying seriousness. Hence, these are difficult to manage.

CASE REPORT-

33-year-old female presented to our trauma ward with an alleged history of fall of iron rod from a height of 15-20 feet, causing penetrating chest trauma on the right side of the chest. At presentation, the rod was 35–40 cm long and 2 cm thick, piercing the chest wall, with entry on the right side, at the level of the 2nd rib posteriorly, and exit from the 4th intercostal space. On presentation, she was conscious and oriented. Vitally stable with no visible bleeding externally from the sites of entry and exit. On arrival, the resuscitation protocols were followed. The primary survey was normal. Cardiovascular examination was normal while respiratory system showed decreased air entry on right compared to the left, with no added sounds. Patient was subjected to USG-FAST, which was negative, and chest x-ray revealed a metallic rod traversing through the chest cavity with no obvious fractures, pneumothorax, hemothorax, widening of the mediastinum, and cardiomegaly. Complete blood count, serum electrolytes, renal function test were normal. An emergency open thoracotomy with a cardiothoracic surgeon on standby was planned. The anaesthesia plan was general anaesthesia with endotracheal tube intubation in a lateral position, as supine position was difficult due to the placement of the rod. A difficult airway cart was kept ready. Plan B was to do endobronchial intubation with single lumen tube (SLT) if lung isolation was needed.

After taking the written consent, patient was transferred to the operation theatre table, given left lateral position, standard ASA monitors were attached, vitals checked and noted, a three-wide bore IV were insitu, and intravenous fluid was started. Premedications (inj. glycopyrrolate 0.2 mg, inj. fentanyl 2 ug kg⁻¹) were given, and preoxygenation was done for 3 minutes. Patient was induced with Inj.

Propofol 2 mg kg⁻¹ and Inj. Ketamine 1 mg kg⁻¹, once ventilation was confirmed, Inj. atracurium 0.75 mg kg⁻¹ was given, ventilated with oxygen and air for 2.5 minutes and 100% oxygen for 30 seconds, patient was intubated in a single attempt with a 6.5-cuffed endotracheal tube by video laryngoscopy in the left lateral position with head tilted slightly upward, maintained on O₂ + air + sevoflurane and intermittent atracurium. For analgesia, injectable fentanyl (3 ug kg⁻¹) and paracetamol (1 g) were given intraoperatively. They confirmed the position of the rod, and due to the rod, there were aberrations over upper zone of the right lung. Under vision, the rod was removed after confirming no cardiovascular and airway injury. No air leak from the lung site was found. Before closure, an intercostal drainage tube was inserted; column movement was confirmed. Patient was extubated on table, as had stable hemodynamic profile through out the procedure with normal arterial blood gas by the end of the surgery.



Fig1: Left lateral position for intubation



Fig 2: X-ray showing path of the rod



Fig 3: Intubation with VLS

DISCUSSION-

Penetrating chest injuries may be life-threatening due to injury to the lungs, heart, and great vessels. And 80-85% of the chest trauma patients can be rapidly stabilised and resuscitated by a few critical procedures². In cases of chest trauma, penetrating injury may lead to pneumothorax, hemothorax, lung contusion, cardiac tamponade, pneumomediastinum, esophageal injury, vascular injury, and rarely spinal injury³. In the management of penetrating injuries, it is important to avoid removing the penetrating object without having any idea of its path inside the thoracic cavity; removal of the object should be done under vision. Variations in site, aetiology, degree of damage to the vital organs, and time of presentation determine the patient's condition at presentation and hence require a tailor-made approach for every patient.

Thoracotomy to remove a penetrated iron rod inside the chest wall requires lung isolation with the help of a double lumen tube or bronchial blockers. In case of emergency and unavailability, conventional endotracheal intubation with a single lumen tube (SLT) can be done, and then can be proceeded with endobronchial intubation. But a SLT with endobronchial intubation poses challenges - no suctioning of the isolated lung, the inability to administer continuous positive pressure ventilation, and misplacement after the positioning. In our case, we went ahead with SLT intubation and planned to isolate the lung after confirming the placement of the rod, as the investigations, i.e., USG FAST and chest xray, did not reveal any injury to the lungs, heart, or major vessels. The insertion of a DLT demands time, and its placement is confirmed with the help of fiberoptic bronchoscopy (FOB) and its availability in emergency hour is a major limitation in various institution. **Hee Young Kim et al.⁴ (2016)** compared the single lumen endotracheal tube and the double lumen endobronchial tube used in minimally invasive cardiac surgery for the fast track protocol in 96 patients and found that the insertion of SLT and DLT would not affect the failure of the fast track protocol, and the insertion of SLT is feasible and can be a good alternative method for DLT.

Gupta S et al (2015) published a case report of emergency anaesthesia management of penetrating thoracic trauma, in which the penetrating object entered posteriorly on the left 12th rib and exited anteriorly from the left 3rd intercostal space. CT scan of the chest was done, and it ruled out major cardiovascular and airway injuries. And hence, the patient was intubated in a lateral position with a 7-mm endotracheal tube. After incision of the thoracotomy, the endotracheal tube was pushed inside blindly as there was no FOB available in the emergency hours, and the left lung was isolated.

Resuscitation, imaging, airway management, and positioning for surgery pose unique challenges in such patients and require careful planning and a multifaceted approach by the anaesthetist and the trauma team.

Das et al. (2006) stated that early assessment, accurate diagnosis, and rapid management with no attempt to remove the penetrating object helped in successful management.

CONCLUSION-

In emergency situations where the availability of DLT is questionable, after confirming the path of the penetrating object, SLT with endobronchial intubation can be a good alternative. Early assessment and rapid management with no attempt to remove the penetrating object are the general rule in cases of penetrating injury. Lateral positioning is a better way to intubate in these cases.

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