

# Penetrating Chest Trauma with Iron Rod In-situ: A Surgical Challenge

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## ABSTRACT

**Introduction:** Chest trauma both blunt and penetrating constitutes 10-15% of all traumas and 25% of all deaths from traumatic injuries.

**Case report:** We present a case of penetrating right chest trauma following road traffic accident (RTA) with big metallic rod in-situ, entering from right axillary region and coming out from posterior chest wall. The force of impact was so severe that the heavy iron rod got bent upon itself making its removal a surgical challenge.

**Conclusion:** In cases of penetrating chest trauma early assessment, accurate diagnosis, and rapid transport with no attempt to remove the penetrating foreign body and meticulous planning play key role in its successful management.

**Keywords:** Penetrating Chest Injury, Open Pneumothorax, Intercostal Drainage (ICD) Tube

## INTRODUCTION

Chest trauma injuries comprise 10-15% of all traumas in India, most common being rib fracture resulting in hemothorax or pneumothorax or both. 25% of deaths due to trauma are because of chest trauma.<sup>1</sup> Mechanism of chest trauma can be blunt or penetrating injury. Morbidity and mortality associated with thoracic trauma are due to the disruption of respiration, circulation or both. Penetrating injuries can be mild or life threatening depending on the site, course of the penetrating object and depth of injury. Major vascular structures like heart, aorta, pulmonary artery, superior venacava, pulmonary veins etc are present in the chest which can be injured by the penetrating trauma and can be life threatening. Lung, tracheo bronchial tree, esophagus, diaphragm, nerves, ribs and vertebra can also be injured. These penetrating injuries are usually difficult to manage. It's rare to get a case of penetrating chest injury following RTA with rod inside the chest.

## CASE REPORT

A young male from Jaunpur, truck driver by occupation presented in our emergency, after 2-3 hrs of suffering a high impact road traffic accident wherein the force of impact was sufficient to drive a 4 feet long, 3 inch thick metallic rod (fig-1a and 1b) into his chest wall, with entry being from right axilla and exit from interscapular region. On presentation, patient was conscious but disoriented due to dehydration and shock associated with pain of trauma. His respiratory rate was 24 per minute, pulse 94 per minute and blood pressure 100/70 mm Hg. Entry wound on right sided chest wall was sucking type through which air was entering into thoracic cavity and also coming out through the

same. There was no active bleeding externally. Emergency resuscitative measures were carried out using intra venous fluids, analgesics, antibiotics and patient was subjected to CT Thorax and NCCT Head which revealed contusion of right upper lobe lung and hemo-pneumothorax. (Fig 2). Right ICD was inserted to combat haemo-pneumothorax. Both the entry and exit wound were properly sealed by dressing to prevent progression of pneumothorax. Patient became fully conscious and oriented, once his shock was managed.

The patient was taken up for surgery, his arterial and central venous line were put and double lumen endotracheal tube was used for ventilation. As metal rod was bent upon itself



**Figure-1a and 1b:** (Penetrated metallic rod into the chest wall, entry being from right axilla and exit from interscapular region in the back)

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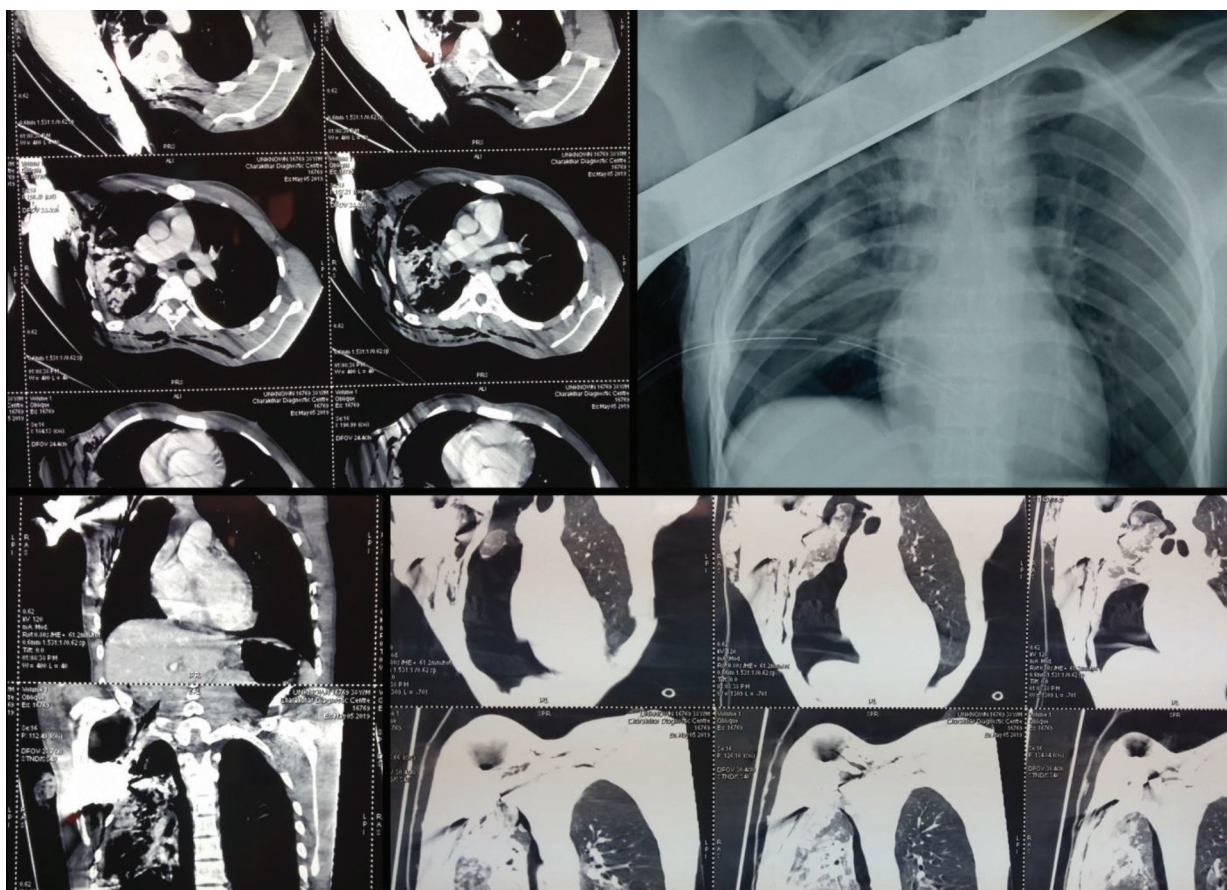
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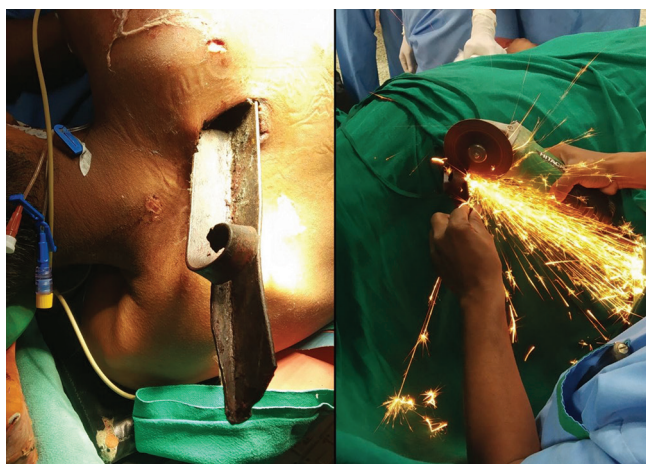
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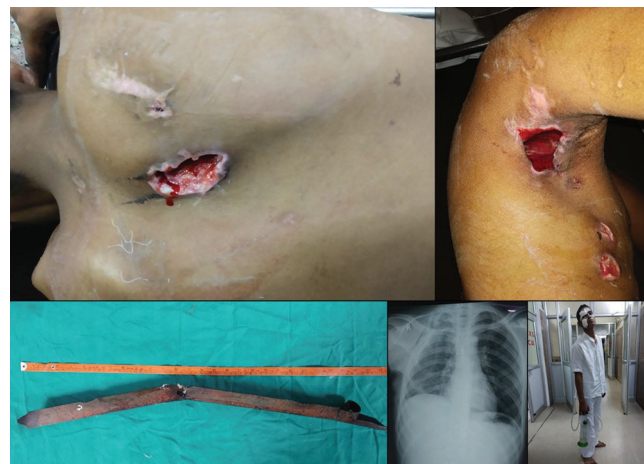


**Figure-2:** (CT and Xray chest showing rod in the right chest and pneumothorax with collapsed right lung )



**Figure-3:** (Bent end of metal rod and cutting of that part using electrical saw)

due to force of impact preventing its removal (Fig 3), it was cut from the portion it was bent, using electrical saw from the engineering department of hospital. While cutting the rod, special care was taken so that skin of the patient doesn't get burnt by heat generated from electric cutter. The whole area was draped with wet towels and continuous water was sprinkled on the hot metallic rod, as it was being cut. After that the rod was pulled out carefully from same tract as that of its entry and exit. The tract had torn bruised and avulsed muscles in absence of any active bleeding. The skin around site of entry and exit was necrosed and missing. No rib fracture was present.



**Figure-4** (Left upper to right clock wise--healing wounds of exit and entry site respectively, the patient in post-operative period with ICD, post-operative x-ray chest showing complete expansion of right lung, the metallic rod after removal)

Major dilemma faced by the operating team in this case was whether or not to perform thoracotomy, as un-necessary thoracotomy would add to the post-operative morbidity. We decided to perform thoracoscopy and proceed forward. Inter coastal drain put earlier was taken out and a thoracoscope was introduced through the same opening to inspect pleural cavity after putting him on single lung ventilation. In such cases if thoracoscope is not available, one can also use flexible bronchoscope as an alternative. On thorocostomy, patient was found to have suffered minor lung contusion of

the right upper lobe with no major vessel damage or active bleed. There was no air leak present. With these finding it was decided that thoracotomy is not required and hence ICD was re inserted from the same site. The open thoracic wound was washed thoroughly with normal saline and packed with betadine soaked gauze to prevent any post-operative infection and hemorrhage. Avulsed muscles were not sutured and instead left to heal by secondary intention. Necessary debridement of dead tissues was done. Patient was shifted to ICU and was extubated on the same day. Right lung was fully expanded.

Regular dressing of the open wound was done which healed very rapidly (fig-4). After 1 month the intercostal drain was taken out when the open wound was completely obliterated. Regular physiotherapy was given to patient to prevent any resulting deformity. He was discharged from the hospital with almost full recovery and some limitation in ninety degree plus abduction of right upper limb. His neck movements were normal. In his follow up visit after a month his right shoulder regained almost total recovery.

## DISCUSSION

80-85% of chest trauma patients can be rapidly stabilized and resuscitated by a handful of critical procedures.<sup>2</sup> Most of thoracic traumas are blunt traumas and the rest of them are penetrating injuries<sup>3</sup>. Total mortality rate of chest traumas ranges between 3.6% and 37%.<sup>4,5</sup> High-velocity bullet injuries are typically fatal.<sup>6</sup> In thoracic traumas, intrathoracic pathologies are pneumothorax, hemothorax, lung contusion, cardiac tamponade, pneumomediastinum, esophageal injury, spinal cord injury, and vascular injury.<sup>7</sup> Rib fractures are the most common findings in symptomatic patients after blunt chest trauma.

The general rules of penetrating trauma management are, to avoid in-depth exploration of wound site, to avoid removal of penetrating object without accurate diagnosis and knowledge of its path and to do so only in presence of anesthesia and surgical back up.<sup>8</sup> Majority of deaths in such cases are due to serious vascular injury.<sup>9</sup>

Among several traumatic severity score systems; simple fractured ribs number is a precise and fast one which indicates the severity of thoracic and extra-thoracic injuries and predicts the prognosis.<sup>8</sup>

An open pneumothorax is a sucking chest wall wound from a penetrating injury, with the wound open to atmosphere, resulting in equilibration between intrathoracic and atmospheric pressures. It is treated with placing a square dressing tape on three sides to create an escape valve. Ultimately a chest tube is placed ipsilateral to the side of wound but at a different anatomic location than the wound and the open wound is sealed with help of dressing.<sup>10</sup>

This case was brought to our notice without removing the rod from its position and the patient was rapidly assessed, intervention planned and managed accordingly. The role of whole team is critical in such cases for a positive outcome.

## CONCLUSION

With the increasing incidence of road traffic accidents, there is a rise in the number of chest trauma too. Though blunt traumas are more common, penetrating chest trauma prove to be more fatal. So, in such cases, early assessment, accurate diagnosis, and rapid transport with no attempt to remove the penetrating foreign body and meticulous planning play key role in its successful management.

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