

Impalement Thoracoabdominal Trauma Secondary to Falling on Metallic (Iron) Bars: An Extremely Rare and Unique Case

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Abstract

Introduction: Penetrating thoracoabdominal injuries are potentially life threatening due to the associated hemorrhagic shock and visceral injury. Through and through penetrating injury with polytrauma is rarely encountered.

Case Presentation: Here we report on a 25-year-old male with penetrating thoracoabdominal injury caused by a metallic (iron) bar projecting from a pillar of a construction site after he fell down from a height.

Conclusions: Anesthetic and surgical management was difficult due to the inability to position in supine and rapidly progressing hemorrhagic shock. Surgical management for extraction of this iron bar and intensive monitoring and resuscitation resulted in an uneventful successful outcome.

Keywords: Thoracoabdominal, Metallic, Penetrating Trauma

1. Introduction

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.

Impalement injuries result when a rigid object penetrates and remains lodged within the body. While these injuries are rare, and many patients die at the scene, they often produce complex anesthetic and surgical management due to the inability in positioning of the patient and the risk of sudden hemorrhage.

Rare penetrating injuries by kebab's skewer, (1) hockey stick, (2) self-infliction with five knives or falling on one metallic bar (3) has been reported. Here we report on a very rare and unique case with three projecting heavy metallic rods in a through and through penetrating thoracoabdominal injury due to falling laterally on an iron bar projecting from a pillar of a construction site after he fell down from a height (3-6).

We also present a literature review on impalement injuries and discuss the general management of these injuries.

2. Case Presentation

A 25-year-old male construction worker was brought to the emergency department of Alzahra Hospital after falling down, during working hours, from a height (fifth floor of a building) on a metallic (iron) bar projecting from a pillar of a construction site. There was a delay in reaching the hospital as the penetrated metallic rod had

to be cut from the pillar. The patient presentation at the emergency room is shown in Figure 1.

At the emergency department the patient was conscious, oriented and stable hemodynamically. Clinical examination showed three metallic rods with entry site through the the left arm, left abdominal region and left upper femoral region and exit site from the left scapula, right abdominal region and right upper femoral region, with no other external injury, audible heart sound with no added sound, no raised jugular venous pressure (JVP), flat and soft abdomen and palpable peripheral pulses. All neurological examinations were normal, and the patient's sensory level was zero. The patient resuscitated with intravenous fluid through two large bore cannulas.

Chest X-ray was done and showed a metallic rod in the left arm and scapula with no obvious fracture of bones, no pneumothorax or hemothorax and no widening of the mediastinum. Pelvic X-ray was also done and showed a metallic bar, which crossed both limbs. Focus Abdominal Sonography for Trauma FAST was done and showed no abdominal free fluid or visceral injury.

The patient was transferred to the emergency operating room, where the exploratory laparotomy was performed. There was no blood and no injury of viscera in the abdomen. The metallic bar crossed from the retroperitoneal space, through the vertebral body and posterior of Psoas muscles and exited from the right side. Inferior vena cava, aorta and mesenteric vessels were not damaged. We detected a piece of bone in the peritoneum; later we found it was part of the

L4 vertebral body that was fragmented by the iron bar. As shown in Figure 2, the postoperative computed tomography showed that one of the iron bars had crossed through the L4 vertebral body. After coordination with neurosurgery services the metallic rod was pulled out and hemostasis was controlled. Surgical wounds were closed with layers.

Bilateral superficial femoral arteries exploration was done. There was no injury of vessels and the foreign body was pulled out and the wound was closed after washing.

The metallic bar in the arm was also pulled out after coordination with orthopedic services.

The patient was treated by broad-spectrum antibiotics and weaned from mechanical ventilation. He was then discharged from the Intensive Care Unit (ICU) and admitted to an ordinary ward, after which he had uneventful recovery and was discharged from the hospital with a good general condition.



Figure 1. The Patient at the Emergency Room



Figure 2. Postoperative Computed Tomography Scan Showing Damage to the Vertebral Body of L4

3. Discussion

Although penetrating injuries of the abdomen are common, presentation with projecting in situ foreign bodies is rare (3, 7). Various types of objects causing such injuries include glass, knife, barbed wire, bearing scrapper, plank, forklift, broomstick and metal hooks (7-10). To date, a few impalement injuries have been reported. To the best of our knowledge, our case was the first case with impalement injury by three iron bars at three different important regions (abdomen, thighs and shoulder) that have major vessels.

Survival following a through and through penetrating abdominal injury with a large heavy iron rod is rare and miraculous and rarer still when associated with poly-trauma. Difficulties in managing such a patient are numerous due to hemorrhagic shock, urgency of surgical intervention and inability to position the patient supine.

Resuscitation and close monitoring prior to and during surgery, especially at the time of removal of the 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 pillar (10-13).

Positioning to administer anesthesia was difficult. During the removal of the foreign body, anticipation of sudden gushing out of blood from an injured major vessel was essential. Surgical removal of the foreign body might have relieved the plugging effect of the foreign body on the breach in injured blood vessels wall. Fortunately, our patient did not have any injury to the inferior vena cava or aorta although such association is well known (14, 15).

If confronted with this type of injury, a team comprised of a general surgeon, a gynecologic surgeon, and an orthopedic surgeon should be assembled to remove the object and treat any potential complications. We suggest that in these impalement injuries, removal of iron bars should be under direct vision after laparotomy and exploration of major vessels.

Footnote

Authors' Contribution: Study concept and design: Mohsen Kolahdouzan; acquisition of data: Mohammad Taqhi Rezaee; drafting of the manuscript: Mohammad Taqhi Rezaee and Shahab Shahabi; critical revision of the manuscript for important intellectual content: Mohsen Kolahdouzan; administrative, technical, and material support: Mohammad Taqhi Rezaee and Shahab Shahabi; study supervision: Mohsen Kolahdouzan.

References

1. Golbasi Z, Cicek D, Ucar O, Kaya D, Keles T, Cicekciolu H, et al. Traumatic ventricular septal defect and mitral insufficiency after a Kebab's shish wound to the chest. *Eur J Echocardiogr.* 2001;2(3):203-4. doi:10.1053/euje.2001.0074. [PubMed: 11882454]
2. Kennedy J, Green RS, Henteleff H. Penetrating chest trauma secondary to a composite hockey stick injury. *CJEM.* 2006;8(6):437-40. [PubMed: 17209495]

3. Panchamia V, Thaker N, Jadeja C, Shah BJ. Emergency anaesthetic management of cardio-thoracic & abdominal injury. *Indian J Anaesthes*. 2007;**51**(2):131.
4. Baraka AS, Sayyid SS, Assaf BA. Thiopental-rocuronium versus ketamine-rocuronium for rapid-sequence intubation in parturients undergoing cesarean section. *Anesth Analg*. 1997;**84**(5):1104-7. [PubMed: 9141939]
5. Dutton RP, McCunn M, Grissom TE. Anaesthesia for trauma. In: Miller RD, editor. *Miller's Anaesthesia*. Philadelphia: Churchill Livingstone; 2010. pp. 2277-311.
6. Wang LT, Wu CC, Hsiao CW, Feng CC, Chang CF, Jao SW. Steel bar penetrating injury of rectum and vertebral body without severe morbidities: report of a case. *Dis Colon Rectum*. 2009;**52**(2):346-8. doi:10.1007/DCR.0b013e318199daed. [PubMed: 19279434]
7. Edwin F, Tettey M, Sereboe L, Aniteye E, Kotei D, Tamatey M, et al. Impalement injuries of the chest. *Ghana Med J*. 2009;**43**(2):86-9. [PubMed: 21326848]
8. Germerott T, Flach PM, Furter M, Ampanozi G, Ruder TD, Thali MJ. Fatal thoracic impalement on postmortem imaging. *Leg Med (Tokyo)*. 2011;**13**(2):83-6. doi:10.1016/j.legalmed.2010.11.001. [PubMed: 21131226]
9. Winfield RD, Parr AG, Ang DN, Martin TD, Chen MK, Seagle MB, et al. A case of dual thoracoabdominal impalement in vehicular trauma. *Am Surg*. 2008;**74**(8):757-60. [PubMed: 18705582]
10. Tantry TP, Kadam D, Shetty P, Adappa KK, Muralishankar B, Shenoy SP. Penetrating abdominal injury in a polytrauma patient: Anaesthetic challenges faced. *J Anaesthesiol Clin Pharmacol*. 2011;**27**(2):272-4. doi: 10.4103/0970-9185.81846. [PubMed: 21772699]
11. Al-Sayed H, Sandogji H, Allam A. Penetrating chest trauma secondary to falling on metallic (iron) bar. *Ann Thorac Med*. 2009;**4**(4):211-2. doi:10.4103/1817-1737.56005. [PubMed: 19881168]
12. Moncure M, Konie JA, Kretzer AB, Dipasco PJ, Braxton CC. Survival Following Rectal Impalement through the Pelvic, Abdominal, and Thoracic Cavities: A Case Report. *Case Rep Med*. 2009;**2009**:361829. doi:10.1155/2009/361829. [PubMed: 19718249]
13. Sawhney C, D'Souza N, Mishra B, Gupta B, Das S. Management of a massive thoracoabdominal impalement: a case report. *Scand J Trauma Resusc Emerg Med*. 2009;**17**:50. doi:10.1186/1757-7241-17-50. [PubMed: 19811644]
14. Hsu KF, Wu CC, Wen CC, Mai CM, Hsiao CW. Steel bar impalement-the great fortune of misfortune. *J Trauma*. 2011;**70**(3):E53. doi:10.1097/TA.0b013e31819adb62. [PubMed: 21610336]
15. Vaslef SN, Dragelin JB, Takla MW, Saliba EJ. Multiple impalement with survival. *Am J Emerg Med*. 1997;**15**(1):70-2.