



An Unusual Case of Transorificial Abdomino-Thoracic Impalement Injury in a Child

Hemanshi Shah^{1*}, Charu Tiwari¹, Shalika Jayaswal¹, Keshav Murthy¹

¹Department of Paediatric Surgery, TNMC & BYL Nair Hospital, Mumbai Central, Mumbai, Maharashtra, India

*Corresponding author: Hemanshi Shah

Address: Department of Paediatric Surgery, TNMC & BYL Nair Hospital, Mumbai Central, Mumbai, Maharashtra, India
Tel: +91-022-2223027671; Fax: +91-0712-6631896
e-mail: hemanshishah@gmail.com

Received: May 6, 2016

Revised: July 21, 2016

Accepted: August 8, 2016

ABSTRACT

Impalement injuries are rare in the paediatric age group. Still rarer are injuries which traverse multiple body cavities. Such injuries require multispecialty management at a tertiary care centre. We describe a case of an accidental impalement injury in a 12-year-old boy after a fall from height.

Keywords: Impalement injury; Metal rod; Child.

Please cite this paper as:

Shah H, Tiwari C, Jayaswal S, Murthy K. An Unusual Case of Transorificial Abdomino-Thoracic Impalement Injury in a Child. *Bull Emerg Trauma*. 2016;4(4):236-239.

Introduction

Impalement injuries occur due to penetration of a body cavity or region by an object which remains in situ. These have features of both penetrating and blunt trauma. These injuries are associated with lower velocity but significant blunt force. Impalement injuries are uncommon injuries, more so in the paediatric age group. They are one of the most severe forms of penetrating injuries. In the past, only a few cases have been reported in which the patient recovered without sequel [1]. Transanal-pelvic and thoraco-abdominal impalement is one of the most severe types of penetrating trauma requiring a challenging management and with an unpredictable outcome [2-4]. Nowadays, such impalement injuries are usually due to foreign

bodies (solid and elongated objects) inserted into the rectum within homicidal, psychiatric or sexual acts [4]. Accidental rectal injuries are usually a result of falling from a height onto a sharp object or collisions [4,5]. Such injuries are often associated with vascular and visceral damage entailing significant morbidity and mortality [4,5]. Management of such injuries involves specific challenges in pre-hospital care, transport and appropriate surgical strategies in the operating theatre [4]. We describe a case of transrectal pelvic-abdomino-thoracic impalement injury in a child who had an uneventful recovery.

Case Report

A 12 year-old boy was admitted with metal rod impalement through the body. While playing at an

abandoned construction site with friends, he allegedly accidentally fell over a long exposed construction metallic rod, which pierced through his body and then broke off at the lower end spontaneously due to the weight of the patient. Patient with rod impaled in body fell to the ground. He had received primary treatment at a local hospital-one transfusion was given and local wound cleansing and dressing done. He was brought 9 hours after injury with the rod in situ.

On examination, the rod was seen entering through the anus (Figure 1A) and traversing through the pelvis, abdomen and thoracic cavity; exiting through the right upper chest wall along the mid clavicular line, about 2cms below the clavicle (Figure 1B). The patient was conscious with pulse of 90 beats/min

and blood pressure of 110/70 mmHg. Air entry was absent in the right lower zone. Abdomen was soft and tenderness was present in upper abdomen; there was no distension.

Computed Tomography (CT) scan (Figure 2A and B) suggested minimal hemothorax and moderate collection with air foci in the peritoneal cavity. The rod was seen passing through the right lung in the paracardiac region, piercing the diaphragm and segment IV of the liver and then coursing anterior to the inferior vena cava in the midline. It was seen passing through the small bowel at multiple places and then coursing behind the bladder, entering the rectum and anal canal.

Intra-operatively, right intercostal chest drain was

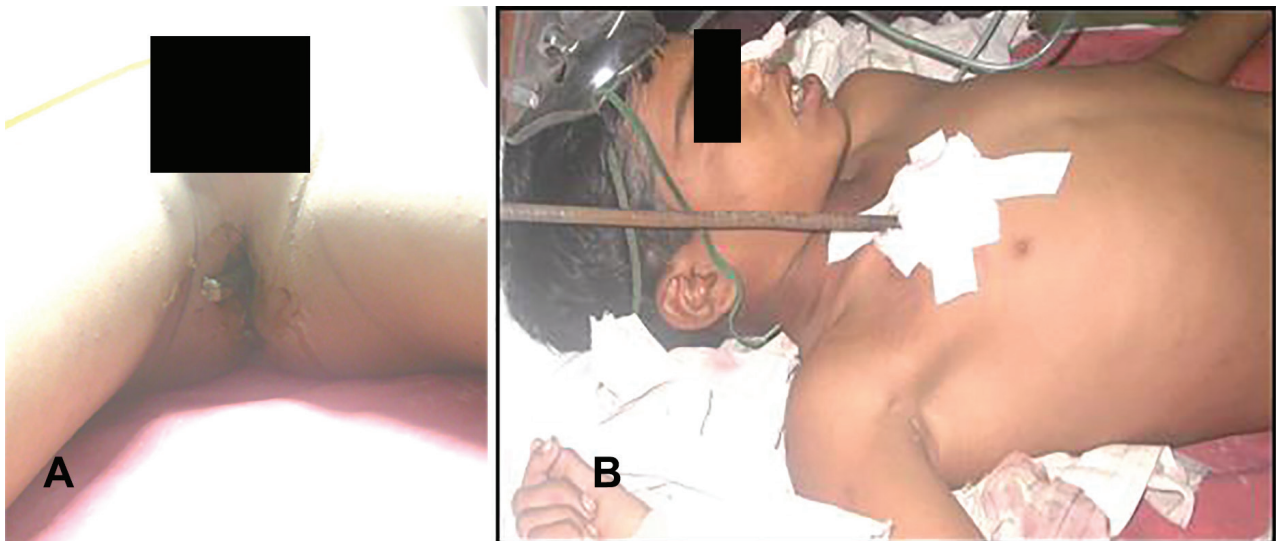


Fig. 1. Clinical photograph showing the rod entering through the anus (A) and exiting through right upper chest wall along mid clavicular line, about 2-cm below the clavicle (B).

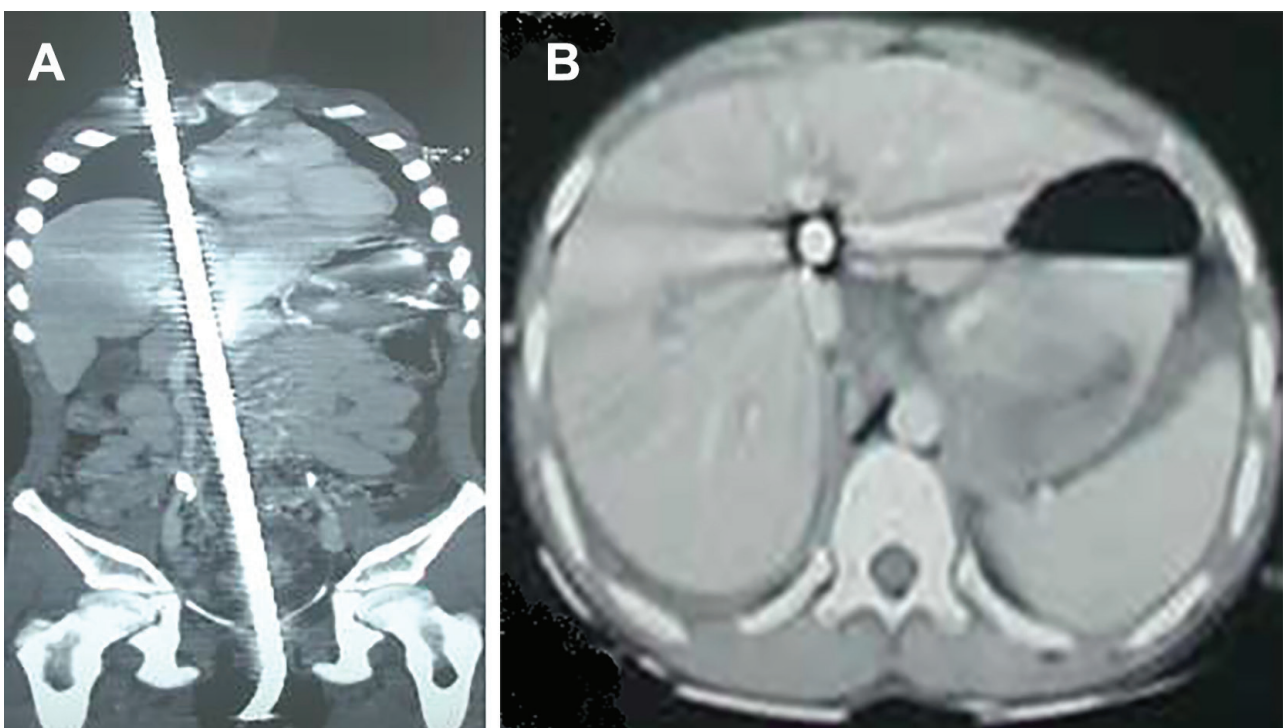


Fig. 2. Coronal (A) and axial abdominopelvic CT-Scan of the patient demonstrating the course of the metal bar through the body organs.

inserted. At Laparotomy, the liver was mobilized and a diaphragmatic tear of 2×1cm was visualized (Figure 3A). The rod traversed through the right lobe of liver with no active bleeding (Figure 3B). Both the entry and exit sites through the liver were visualized. The rod was also seen passing through the small bowel and its mesentery. The rod entered the pelvis posterior to the bladder below the peritoneal reflection. Moderate hemoperitoneum and fecal contamination was present.

There were multiple concerns while removing the rod:

1. A construction rod has spiral corrugations, therefore the injuries it may cause to the vital organs during removal. The rod was rusted.

2. The upper exposed end of the rod was longer and the lower end which was protruding through the anus was small (inadequate grip length) and curved (at the site of spontaneous breakage). Decision to remove it from the lower end was taken so as to avoid increase in contamination and increased trauma due to pointed curved edge.

The duodenum was mobilised and the inferior vena cava was exposed along its length. The exposed ends of the rod were cleaned with spirit and sterile liquid paraffin was applied. The rod was gradually pulled out through the anal end. It measured about 95cms in length and 1.5cms in thickness, was serrated and bent at the lower end. After removing the rod, the abdomen was reassessed.

There were multiple small bowel perforations and a full thickness anterior rectal tear below the peritoneal reflection. Two resection and anastomosis of the perforated small bowel were done and the rent in the diaphragm and the mesentery closed. The tear in anterior wall of rectum was closed and sigmoid loop colostomy was done. The patient was given tetanus

toxoid, anti-gas gangrene immunoglobulin and intravenous antibiotics. He made an uneventful post op recovery. Distal cologram and colostomy closure were done after 8 weeks. Patient has recovered well on follow-up.

Discussion

Impalement dates from the Middle Ages when it was used as a means of executing criminals by introducing a long, thin sharp pole through the anus [6]. Nowadays, impalement injuries are rare. Most reported mechanisms are a fall from height, gunshot injuries, stab wounds, sexual abuse, unusual sexual acts and iatrogenic injuries [6]. These injuries are associated with crush injury, wound contamination and infection which pose difficulties for the operating surgeons [7].

There are two clear groups of patients who present with impalement injuries [1]:

- (i) Those who are dead at the scene of accident or moribund on arrival.

- (ii) Those who have stable vital signs

Impalement injuries are divided into 2 distinct types [8]:

Type I injuries: These are the more classical injuries and result from the impact between the moving human body and an immobile object. These injuries are caused due to falls, motor vehicle collisions and falls over fences.

Type II injuries: These injuries occur after some unforeseen event by intentional manipulation to the human body with a known object. The object is moving and the human body is immobile. Such injuries are seen in assaults, spears and some motor vehicle collisions.

The primary management in the field is to rapidly

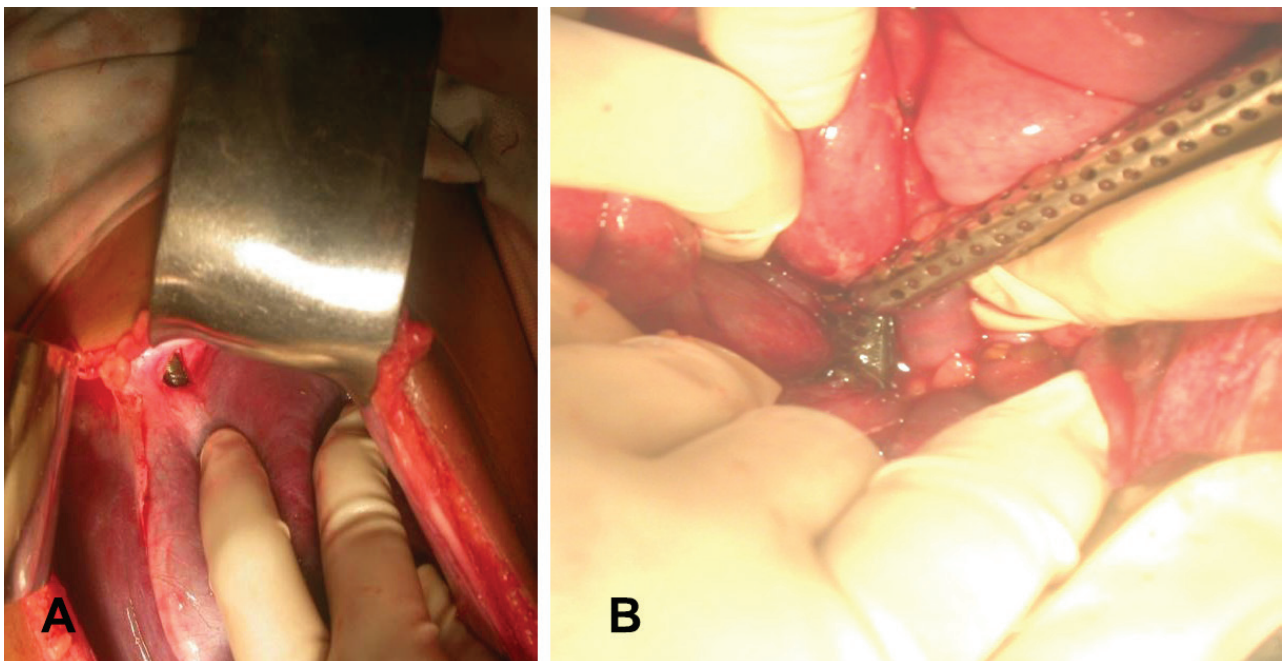


Fig. 3. Intraoperative photograph showing the 2×1cm diaphragmatic tear (A) and the rod passing through the right lobe of liver (B).

transport the victim to the hospital. No attempts should be made to remove the impacted foreign body. An added concern is where disconnection of the object from the site of accident is necessary for transport and appropriate mechanical aids and support from other emergency services need to be recruited.

The usual trauma management principles should be followed by primary survey taking care of Airway, Breathing, Circulation, Disability and Exposure, followed by secondary survey including serial physical examination, local wound exploration, diagnostic peritoneal lavage (DPL), ultrasound, CT scan, laparoscopy and laparotomy. Management of such injuries should be individualized and should take into focus the general condition of the patient, the organs injured and the time elapsed since the trauma. In penetrating abdominal trauma the most commonly injured organs are the liver (40%), small bowel (30%), diaphragm (20%), and colon (15%) [9]. Understanding the full extent of the injury is extremely important to plan the appropriate surgical approach. Triple-contrast helical CT is valuable in accurate evaluation of the thoraco-abdominal organ injury [9]. Operative removal requires careful preplanning tailored to the specific presenting injuries, with early multispecialty involvement [9]. Extensive exposure is mandatory so as to permit extraction of the impaled object under direct vision [6]. Meticulous care of the traumatic wound is necessary [10]. Finally careful follow-up is required for recognition & early management of septic complications [10].

A literature review revealed 6 cases of rectal impalement with pelvic, abdominal and thoracic lesions; only one was in a child [11-14]. Interestingly, in all these cases and our case also, the penetrating object had a more or less similar trajectory: from rectum superolaterally to the right through the pelvic, abdominal, and thoracic cavities. The Romanian prince Vlad Basarab, nickname Dracula “The Impaler”, used to execute enemies and outlaws by impalement [3,15-17]. The executioner was ordered to hammer the stake “professionally”, precisely guiding it in the “right direction”, carefully not to harm any of the most important internal organs. Proper placement of the stake was intended to prolong the suffering by lengthening the victim’s post-impalement survival time [3,15].

In present times, such impalement injuries are survivable and good emergency management could make the difference between life and death in these cases [4]. Fortunately, in this case the rod spontaneously broke off due to the body weight of the patient and consequently the time for transportation was reduced. The medico-legal aspect on the part of the medical fraternity involved in the management of such injuries should not be forgotten. Possibility of criminal intent or sexual abuse should be ruled out. The medical records should be meticulously maintained along with clinical photographs. Proper counselling of relatives regarding prognosis and outcome is essential pre- and postoperatively.

Conflict of Interest: None declared.

References

- Shikata H, Tsuchishima S, Sakamoto S, Nagayoshi Y, Shono S, Nishizawa H, et al. Recovery of an impalement and transfixion chest injury by a reinforced steel bar. *Ann Thorac Cardiovasc Surg*. 2001;7(5):304-6.
- Eder F, Meyer F, Huth C, Halloul Z, Lippert H. Penetrating abdomino-thoracic injuries: report of four impressive, spectacular and representative cases as well as their challenging surgical management. *Pol Przegl Chir*. 2011;83(3):117-22.
- 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.
- Lupascu C, Fotea V, Sarbu P, Andronic D. Rectal impalement injury: from cruelty to salvage endeavour. *Chirurgia (Bucur)*. 2015;110(1):60-5.
- Badri F, Al-Mazrouei A, Azam H, Alamri N. Impalement injury—presentation of two new cases. *Hamdan Medical Journal*. 2012;5(2):173-8.
- Bemelman M, Hammacher E. Rectal impalement by pirate ship: A case report. *Injury Extra*. 2005;36(11):508-10.
- Oya S, Miyata K, Yuasa N, Takeuchi E, Goto Y, Miyake H, et al. Impalement injury to the left buttock with massive bleeding: a case report. *Nagoya J Med Sci*. 2013;75(1-2):147-52.
- Eachempati S. Impalement injuries. *Duke Trauma Newsletter*. 1998;2:6-7.
- Shanmuganathan K, Mirvis SE, Chiu WC, Killeen KL, Hogan GJ, Scalea TM. Penetrating torso trauma: triple-contrast helical CT in peritoneal violation and organ injury—a prospective study in 200 patients. *Radiology*. 2004;231(3):775-84.
- Horowitz MD, Dove DB, Eismont FJ, Green BA. Impalement injuries. *Journal of Trauma and Acute Care Surgery*. 1985;25(9):914-6.
- 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.
- Lear GH, De KR, Birt SJ. Impalement injury by a tree branch from rectum to right nipple. *Injury*. 1981;12(6):495-8.
- Ho LC, El Shafei H, Barr J, Al Kari B, Aly EH. Rectal impalement injury through the pelvis, abdomen and thorax. *Ann R Coll Surg Engl*. 2012;94(6):e201-3.
- Kasapas K, Daskalaki A, Kaimasidis G, Chalkiadakis G. Successful management of a combined abdominal and thoracic trauma with rectal impalement: report of a case. *Case Rep Surg*. 2013;2013:816089.
- Florescu R, McNally RT. Dracula: a biography of Vlad the Impaler, 1431-1476: Hawthorn Books; 1973.
- McNally RT, Florescu R. In search of Dracula: The history of Dracula and vampires: Houghton Mifflin Harcourt; 1994.
- In: Romanian Student Association. Axinte A. Dracula: between myth and reality. Stanford University. Available from: http://www.stanford.edu/group/rsa/_content/_public/_htm/dracula.shtml.